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SUMMARY OF RECENT ABSTRACTS*

III. MALARIA†

General

In his final report, before retiring from the post of Director, BAGSTER WILSON (p. 776) gave an account of the development of the East African Institute of Malaria and Vector-Borne Diseases since its inception as the East African Malaria Unit in 1951. Its activities included the training of personnel of all grades, consultation with various bodies on malaria problems, surveys throughout East Africa, experiments (on a large scale) on residual insecticide spraying and its results, and intensive studies on the biology of the vectors.

BRUCE-CHWATT (p. 552) has written a comprehensive review of the history of malaria in the U.S.S.R., the structure of the health services and the organization of control measures. The review should be read in full.

SANDOSHAM (1959, p. 1298) has published a comprehensive book on malaria and its control with special reference to Malaya, which is a notable contribution to the literature of the disease in that country.

SHUTE and MARYON (p.970) have produced a valuable book on laboratory technique for the study of malaria, the outcome of many years of careful work and experience. It deals with the examination of blood, the dissection of mosquitoes, and the maintenance of mosquito colonies. There are many practical hints.

METSELAAR and VAN THIEL (p. 96) suggest that the classification of malaria (hypoendemic, mesoendemic, hyperendemic, holoendemic) should be based on parasite rates. They argue that the adult spleen rate may be high or low in holoendemic malaria, and this may be in part a reflection of nutritional status or the sickle-cell trait. RACHOU (p. 211) discusses the classification of malaria, but suggests that classifications which relate to differences in intensity have no significance in the development of an eradication programme, where zero is the goal.

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1960, v. 57. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on malaria in this series, see the March and April issues of the *Tropical Diseases Bulletin* each year since 1939.

Epidemiology

RANQUE *et al.* (p. 1012) discuss the antimalaria campaigns at Porto-Vecchio, Corsica, where anopheline larvae have recently been found, and where some children still show enlarged spleens.

A small epidemic of malaria occurred in Sicily in 1956, entirely due to *Plasmodium vivax*; CEFALÙ and GULOTTA (p. 212) attribute it to invasion of houses and field shelters by *Anopheles labranchiae* and *A. superpictus*, and show that it was controlled with DDT. Insecticide work had been discontinued in the year before the epidemic.

An outbreak of *P. vivax* malaria occurred in 1957 in part of Turkey, which originated largely from workers in rice fields; GÖKBERK *et al.* (p. 212) show that rainfall was high that year, large numbers of migratory workers were present—the people sleep outside in summer—and the vector was *A. sacharovi*, which showed behaviouristic (and possibly physiological) resistance to DDT.

ZAHIR and DABBAGH (p. 4) describe a malaria survey of north-west Saudi Arabia. Parts are free from malaria but in other parts it is moderately prevalent; *A. sergenti* and *A. superpictus* are vectors.

MAFFI (p. 1137) gives an account of malaria in part of Somalia between the Gulf of Aden and the Indian Ocean; it is largely due to *P. falciparum* transmitted by *A. gambiae*, but eradication is possible if planned carefully on a large scale. The disease is epidemic and only to a lesser degree endemic, and mass treatment will be important in control.

MALDONAO-CAPRILES and RAFI (p. 4) describe the malaria trends in West Pakistan since 1939.

BHATIA *et al.* (p. 670) report a severe outbreak of malaria, after a period of heavy rainfall and flooding, in Uttar Pradesh in the autumn of 1957, and a few cases in the spring of 1958; sporozoites were found in *A. culicifacies* in the spring.

Malaria was formerly common in Japan, but the incidence has fallen during the past century to very low levels. OTSURU and OHMORI (p. 1138) show that imported malaria became prominent during the wars, but the vector, *A. sinensis*, was reduced as a result of land improvement campaigns. The taxonomy of this species and its varieties is discussed.

Malaria continues to be found in the United States; most of it is imported but DUNN and BRODY (p. 5) report a few autochthonous cases in Oklahoma, and they note that vector anophelines continue to be found in abundance in many areas. The same authors (p. 442) state that malaria eradication is in sight in the United States, despite an abundant potential vector population; they discuss some of the cases (less than 100) diagnosed in 1958, of which only 7 were autochthonous, and of these 4 were induced by blood transfusion.

Malaria still occurs in Trinidad and Tobago (though no longer autochthonous in Tobago); the Annual Report of the Malaria Division (p. 5) shows that *A. aquasalis* and *A. bellator* are the vectors, and for bionomic reasons *A. bellator* is hardly affected by house spraying.

Transmission

BEKLEMISHEV *et al.* (p. 443) have given an account of their technique for determining the physiological age of anophelines. The details could not be included in the original abstract, and should be sought in the original paper (in the English language).

Human skin steadily excretes carbon dioxide, but BROUWER (p. 1140) quotes evidence which suggests that mosquitoes (*A. stephensi*) are not, as had formerly been suspected, attracted to man because of this carbon dioxide.

To obtain a reliable infection rate in anophelines it is essential to dissect them as soon as they are caught, since if they are kept for a few days to enable them to digest the blood meal before dissection the rate may be artificially increased through development of oöcysts; BHATIA *et al.* (p. 669) suggest modifications of dissection procedure to facilitate this.

Although malaria has disappeared from northern Germany the proportion of *A. labranchiae atroparvus* to *A. maculipennis messeae* has not fallen; WEYER (p. 669) notes that in Eastern Frisia and along the Elbe the density of anophelines has diminished markedly though there has been no concerted attempt at control.

KRAFT (p. 6) notes that in part of the Kazakh S.S.R. of Central Asia *A. m. messeae* breeds in water collections caused by flooding of rivers, and reports a study of the meteorological conditions which influence the bionomics of this subspecies.

PARRISH (p. 650) has compiled a check list of the mosquitoes of Turkey, which include 13 species of *Anopheles*. ABDEL-MALEK (p. 880) discusses the distribution and biology of the anophelines of northern Syria.

MARIANI (p. 97) discusses the distribution of *A. labranchiae* in Sicily, and its relationships with the strains inhabiting North Africa.

SENEVET and CLASTRIER (p. 1012) discuss the varieties of *A. claviger*, and record one from France.

COLLIGNON (p. 98) details the breeding and resting places of the anophelines of the Algiers region. SENEVET *et al.* (p. 1013) give an account of the distribution of *A. dthali*, widely dispersed over North Africa.

In an account of the mosquitoes of Zaria Province, Northern Nigeria, HANNEY (p. 1139) observed that *A. gambiae* and *A. funestus* comprised almost the total anopheline daytime resting population in huts; in the rainy season 6·7% and 7·7% respectively were infected, and in the dry season about half as many. A higher proportion of *A. gambiae* than of *A. funestus* were taken outside. The biting habits of the two species are described. Other anophelines were found but they were not infected.

LACAN (p. 99) gives an account of the 39 species of anophelines found in the various countries of French Equatorial Africa. LIPS (pp. 98, 880) sums up information on the anophelines found in Katanga. LAARMAN (p. 98) describes *A. vanthieli*, a new species from the rain forest of eastern Congo.

MAFFI (p. 1013) found, for the first time, *A. gambiae* breeding in salt water as far north as Somalia; *A. squamosus* was also breeding in the same waters. SMITH and WEITZ (p. 778) show that in the swamp villages of South Pare, Tanganyika, man and cattle are the main hosts of *A. gambiae*. In Zululand MORSBACH (p. 670) found *A. gambiae* and *A. funestus* in untreated huts and huts treated with BHC, but not in huts freshly treated with DDT.

In Mauritius (p. 1013) the annual reports of the medical entomologist for 1957 and 1958 give contradictory findings for the hosts of *A. gambiae* caught outside. One series of findings suggested that man was a preferred host, but another series suggested bovines. The investigation is to continue. Females appear to prefer the dark and humid cattle sheds and outdoor resting places rather than the lighter and airier houses, for complete gonotrophic development. The outdoor retreats include thick walls with deep crevices.

In a survey of anophelines caught in sprayed and unsprayed areas of the Kangra District of the Punjab, SHARMA and CHAUHAN (p. 1139) found *A. maculatus*, *A. fluviatilis* and *A. culicifacies*, but none of those dissected was infected. *A. fluviatilis* preferred cattle sheds to human dwellings for daytime resting.

CHOW *et al.* (p. 553) give an account of the bionomics of *A. aconitus* and *A. maculatus* in part of Java. *A. aconitus* is the principal vector of malaria but is exophilic, biting man mostly outside before midnight. *A. maculatus* is also largely found outside. Other species are also present but are not important in malaria.

FRAGA DE AZEVEDO *et al.* (p. 99) give a list of anophelines found in Portuguese Timor; 4% of *A. barbirostris* and 4% of *A. sundaicus* were found to have oöcysts. ZALUTSKAYA (p. 100) discusses *A. minimus* and *A. vagus* in part of Vietnam. *A. minimus* females were evident in the period from October to April, and *A. vagus* in May to October. *A. vagus* is a potentially important vector.

In a survey of the *A. hyrcanus* group in part of Szechuan Province LIU *et al.* (p. 213) point out that the small race of *A. sinensis* is more anthropophilic than the large race, and that *A. kweiyangensis* is an important vector of malaria. HUANG *et al.* (p. 421) report studies on the feeding habits of mosquitoes in Foochow, including *A. sinensis* (the chief vector of *Wuchereria malayi* in the hills and of malaria parasites in rice-field areas), *A. minimus* and *A. jeyporiensis* var. *candidiensis*. LIU *et al.* (p. 778) studied the development and habits of *A. sinensis* and *Culex fatigans* in Foochow. *A. sinensis* bred primarily in clean pools and rice fields, and tended to rest in cattle sheds during the day, preferring to feed on cattle though willing to feed on man.

RACHOU (p. 7) gives an account of the anophelines of Brazil, where the main vectors of malaria are *A. darlingi*, *A. aquasalis*, *A. albitarsis*, *A. cruzii* and *A. bellator*; there are also secondary vectors of local importance. BEJARANO (p. 7) describes the geographical distribution of anophelines in Argentina, where natural infection with malaria parasites has been found in *A. pseudopunctipennis* and *A. darlingi*.

MARTINS (p. 214) points out differences between the adults of *A. cruzii* and *A. homunculus*.

In a review of information on the relationship between malarial parasitaemia and symptoms of the disease, COVELL (p. 1009) draws attention to the importance of asymptomatic parasitaemia as a factor in transmission. In areas of high endemicity the people may suffer a few days of fever each year, but parasitaemia is common. Gametocytes are found largely in children in holoendemic areas, and at all ages in places where malaria is seasonal and epidemic; gametocyte levels too low to be detected at routine blood examination may be enough to infect mosquitoes.

Aetiology

GARNHAM (p. 1011) gives an account of research in the exo-erythrocytic stages of malaria parasites of mammals; the paper should be read in full. The pre-erythrocytic stage of *P. malariae* has not hitherto been demonstrated, but BRAY (p. 6) has now succeeded in finding the pre-erythrocytic schizonts in the liver of a chimpanzee which had been inoculated intravenously with salivary glands of 110 *A. gambiae* which had fed on a Liberian child with gametocytes of *P. malariae* in the blood.

In his last published scientific paper BASTIANELLI (p. 335) discussed the red

cell and the metabolism of the malaria parasite; details should be sought in the original.

SHUTE (p. 671) comments on the persistence of malaria parasites in the tissues of highly premune persons from holoendemic areas who arrive in non-malarial countries and who may give blood for transfusion. *P. falciparum* may persist up to 1 year, *P. vivax* up to 3, and *P. malariae* for 20 or more. Fortunately the English strain of *A. l. atroparvus* is resistant to tropical African *P. falciparum*. Shute also refers to the risks from malaria—and splenomegaly—in young African pugilists. WALTERS (p. 781) has found *P. falciparum* in a Nigerian woman 1½ years after arrival in England.

Pathology: Clinical Findings

In discussing the pathological processes which occur in the liver in malaria MAEGRAITH (p. 778) suggests that a specific factor—possibly a soluble toxin—may be involved, but that the non-specific factor of anoxia, brought about by local and general circulatory disturbances, is important. He discusses these disturbances and the consequent interference with metabolic processes, and the production of centrilobular necrosis which is dependent in part on a reflex pathway in the hypothalamus affecting nervous control of the hepatic vessels. Circulatory failure in malaria may also produce a condition of shock. DATTA (p. 554) discusses liver enlargement in malaria, relating it to the nutritional state and especially to deficiency of animal protein and other elements of diet. In holoendemic and hyperendemic areas of New Guinea the rate and degree of enlargement of the liver increase as the size of the spleen increases, and PETERS (p. 441) concludes that an increase of the malaria burden produces these changes in the liver. WALTERS and MCGREGOR (p. 1141) obtained liver biopsy specimens from children in Gambia, some of whom had received regular antimalarial suppressive therapy, and some (controls) who had not. All the controls had enlarged livers. The authors describe the histological findings; the sinusoids are dilated in chronic malarial hepatomegaly.

From observation of children in Nigeria whose mothers had received pyrimethamine regularly during pregnancy, and who were themselves similarly protected from birth, and by comparing these with control children, EDOZIEN *et al.* (p. 779) found that gamma globulins in the serum of the infants were normal for a year and then rose—but higher in the unprotected children. The gamma globulin levels in health were highest in persons of low economic status, and nutrition was not thought to be a factor, but the Africans may have an inherited tendency to high rates. The rate was higher in children with the sickling trait. These facts are discussed in relation to malaria.

At Ibadan, south-west Nigeria, GARLICK (p. 1011) found that the crude *P. falciparum* rate, and the fever rate, were lower in children with the sickle-cell trait than in controls, but this advantage disappeared after the age of 3 years. He also found (for the first time) that the rates for *P. malariae* were lower in sicklers than in non-sickler schoolchildren of all ages. It seems likely that sickler women may have a greater number of successful pregnancies than non-sickling women.

In 591 examinations of placentas, and newborn babies, in Eastern Nigeria SPITZ (p. 440) found parasites (mostly *P. falciparum*) in smears from the maternal side of the placenta in about one-quarter, but none in the infants themselves;

congenital malaria is evidently rare. Malarial infection of the placenta was correlated with low birth weight.

In the extensive Taveta-Pare (East Africa) malaria control scheme, where dieldrin has been used for several years, DRAPER (p. 881) observed a dramatic fall in incidence, and a progressive rise in haemoglobin levels. Anaemia remained common, however, and was probably due to iron deficiency; it is debatable how far malaria contributes to the anaemia of tropical populations, but haemoglobin tends to rise when malaria is controlled, some part of this rise probably being the result of improved living standards.

In the antimalaria campaign conducted during several years in East Africa DRAPER and DRAPER (p. 1243) made periodical observations on the growth of African infants before and after the reduction of malaria transmission. In general growth up to the age of 6 months was much the same as in Europe or North America, but thereafter the African infants fall behind, growth rate being reduced and becoming irregular. Malaria control improved parasite rates and haemoglobin, but had no obvious effect on growth rates; adverse influences were the numerous intestinal and respiratory infections, and "fever".

PIGANIOL and COUCHE (p. 336) discuss malaria in persons repatriated to France from endemic areas; they used the Chorine and the Henry reaction for serological tests, and note that they were not very reliable. In some cases the first attack of malaria occurred as late as 9 months after repatriation. BLACK (p. 444) gives an account of malaria as it was encountered in persons of European extraction returning to Australia after a period of residence in New Guinea. Most of the overt attacks occurred during the second month after suppressive treatment had been stopped, but in some the attack did not occur until 5 or even 9 months had elapsed.

JANSSENS and RAVESCHOT (p. 1015) observed a case of encephalopathy of the Wernicke type in a patient suffering from severe prolonged *P. falciparum* malaria.

A nephrotic syndrome is common in child patients at Ibadan, Nigeria, and GILLES and HENDRICKSE (p. 1015) show that this is strongly related to *P. malariae* infection [as it was in British Guiana], but antimalaria treatment has not hitherto influenced the course of the disease. CARTER (p. 1016) comments that this syndrome is rare in Freetown, Sierra Leone, but so is *P. malariae*, and this negative evidence tends to support the suggestion that the two diseases are related.

CORRADETTI (p. 1140) discusses relapses in avian and mammalian malaria; they occur spontaneously only in those mammalian parasites in which the pre-erythrocytic development takes place in the liver. But relapses are produced mainly by parasites surviving in the erythrocytes of the blood stream, since in blood-induced infections they commonly occur in the absence of EE forms in the liver.

Charles Wilcocks

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

McFie, J. **Malnutrition, Malaria and Mortality. The Use of a Simple Questionnaire in an Epidemiological Study.** Addendum to a paper by J. Gongora & J. McFie (*Transactions*, 1959, v. 53, 238). *Trans. Roy. Soc. Trop. Med. & Hyg.* 1960, Sept., v. 54, No. 5, 471–3.

In the earlier paper [this *Bulletin*, 1959, v. 56, 1174] the figures for sib mortality included the children brought to the dispensaries in Uganda, and since these children were necessarily alive the mortality figures were misleadingly low. The data are here re-analysed. The mortality rates are about 9% higher than before, and accord better with other data.

The opportunity has been taken to investigate the separate effects on mortality of levels of malaria and malnutrition, by a multiple regression calculation. Both effects are significant, but the effect of the prevalence of malaria is the more marked. *P. Armitage*

Baer, H. W. Winterfänge von *Anopheles*-Mücken. [**Winter Catches of Anopheline Mosquitoes**] *Angew. Parasit.* Jena. 1960, v. 1, Pt. 1, 8–11. [Summary taken from *Rev. Applied Entom.* Ser. B. 1960, Nov., v. 48, Pt. 11, 191.]

"The following is based on the author's summary. Winter control of Anophelines depends on a knowledge of their overwintering habits, and such information is given for those that occur in Germany. *Anopheles labranchiae atroparvus* van Thiel, *A. maculipennis maculipennis* Mg., and *A. m. messeae* Flni. hibernate as adults in attics, barns, sheds, cellars and other sheltered places, but *A. claviger* (Mg.) (*bifurcatus*, auct.) and *A. algeriensis* Theo. pass the winter as larvae in their breeding places and *A. plumbeus* Steph. (*nigripes* Staeg.) usually overwinters in the egg."

See also p. 383, Maffi & Coluzzi [*Anopheles macmahoni* **in the Migiurtinia Region, Somalia**].

Brouwer, R. **Variations in Human Body Odour as a Cause of Individual Differences of Attraction for Malaria Mosquitoes.** *Trop. & Geograph. Med.* Amsterdam. 1960, June, v. 12, No. 2, 186–92, 2 figs. [23 refs.]

"Individual differences in man as regards their attraction for *Anopheles stephensi* were demonstrated by means of an olfactometer; the slight differences

demanded a statistical elaboration of the figures. The differences are not due to the degree of moisture, the temperature and the movement of the two air currents which flowed simultaneously over the forearms of two test persons. *Odour* is the factor responsible for the differences in attraction between test persons.

"The test apparatus undoubtedly influenced the possibility to establish correctly the differences in attraction; it was technically impossible to construct two completely identical circuits which would reproduce the olfactory effect in precisely the same way.

"Mosquitos fed either only on man or guinea pigs distinguished between the test persons in the same manner; however, the guinea-pig fed mosquitos were less active on the average than those fed on human blood."

[See also this *Bulletin*, 1956, v. 53, 110; 1960, v. 57, 1140.]

SEN, R. N., RAJA GOPAL, R. & CHAKRABORTY, R. K. **Observations on the Seasonal Prevalence of Adult Anophelines near Dhanbad.** *Indian J. Malariology*. 1960, Mar., v. 14, No. 1, 23–54, 8 graphs & 1 map. [31 refs.]

These observations were made over 5 years at Dhokra, a village where insecticide had not been used systematically, and which is situated 4 miles south-east of Dhanbad in the south-eastern part of Bihar State. The main rainy season is from June to October and this is preceded by hot dry weather in March, April and May.

The observations are based on 30-minute collections of adult mosquitoes made 3 times a week, between 06.00 and 08.30 hours, in a cattle shed, a human dwelling and a mixed dwelling. The results are plotted as man-hour densities per month. *Anopheles annularis, A. pallidus, A. fluviatilis, A. culicifacies* and *A. subpictus* formed 96·5% of the total catch, and 7 other species of *Anopheles* are recorded. The first 3 species were abundant during the winter and spring months, November to March, but were replaced in abundance during the rainy season by *A. culicifacies* and *A. subpictus*. All the species were found to prefer cattle sheds as daytime resting places to human and mixed dwellings.

These results are discussed in relation to observations in other parts of India on the biology of these species. *B. R. Laurence*

RAJA GOPAL, R. & CHAKRABORTY, R. K. **Record of Morphological Variations in *A. annularis* Van Der Wulp near Dhanbad.** *Indian J. Malariology*. 1960, June, v. 14, No. 2, 171–4, 3 figs. on pl.

OHMORI, Y. **Pupal Characters of the *sinensis* Group of *Anopheles* in Japan (Diptera: Culicidae).** *Acta Med. et Biologica*. Niigata. 1960, June, v. 8, No. 1, 15–27, 12 figs. on 2 pls. [32 refs.]

BLACK, R. H. **Investigation of Blood Donors in Accidental Transfusion Malaria —*Plasmodium vivax, falciparum* and *malariae* Infections.** *Med. J. Australia.* 1960, Sept. 17, v. 2, No. 12, 446–9.

During the 4-year period 1956–59, 4 patients who had run no risk of exposure to malaria developed this disease in Sydney, Australia, after blood transfusion. In this period, 217,948 bottles of blood were issued from the Central Headquarters of the Blood Transfusion Service, so that the incidence of infected blood was very small, about 1 infected bottle in 50,000.

Great trouble was taken to trace the donors implicated, and from this study some interesting facts emerged. 2 patients developed *Plasmodium vivax* infections after incubation periods of 7 and 9 days, the blood having been stored for 2 and 4 days respectively. The presumptive source of the first infection, a man who had had malaria in New Guinea, had been living in a malaria-free part of Australia (at Her Majesty's expense) for the previous 11 months. Parasites could not be found in his blood. The second infected donor, who had served in the Australian forces in Malaya until 23 months before blood donation and had taken prophylactic paludrine [proguanil] during this period, was actually incubating an attack of *P. vivax* malaria when bled. This became overt 7 days later. This represents an unusually delayed relapse.

The third patient developed a *P. falciparum* infection 7 days after receiving a transfusion of blood stored for 2 days. The history of this donor is of particular interest. Born in England, he served as a merchant seaman in 1942–45, during which period he had had several attacks of malaria. Further attacks of fever, which he had treated himself with quinine, occurred at Dar-es-Salaam in 1946–47. He then went to New Guinea in 1949, where he had fever in 1950. His next illness occurred on Guadalcanal in the Solomon Islands: though very severe it eventually responded to a self-prescribed treatment of chloroquine and brandy. From this time until his return to Australia 14 months before the date on which he donated blood, he had suffered only mild attacks of fever which responded to aspirin alone. Thick blood films taken 3 weeks after donation showed trophozoites of *P. falciparum* at a density of 1 per cu.mm. Since he was in good health at that time and completely symptom free, he had achieved a degree of premunity remarkable in a European.

The fourth example was a *P. malariae* infection in a psychotic female patient who had received a transfusion of blood, stored for 5 days, 43 days before her attack. This blood came from a young man of Maltese stock born in Bône, Algeria, in 1936. He had been brought to Australia when 9 months old, and had lived in Northern Queensland from 1937 to 1940, after which he was taken to Sydney. Since the incidence of *P. malariae* infections in infants in the Bône district was 5% at the relevant time, while that in Queensland at all ages was very low, it may be assumed that he had harboured his infection for 19 years since infancy. Though in perfect health his blood showed very scanty trophozoites of *P. malariae*.

In the selection of blood donors it used to be the policy of the Australian Red Cross authorities to accept those who lived in a malarious country provided a 2 years' period had elapsed since their return to Australia, during which they had remained free from attacks though taking no antimalarial drugs. Owing to the peripatetic habits of the modern Australians and the wide dispersal of their armed forces, too many volunteers had to be rejected under this rule, and

the period has since been reduced to 1 year. It is recognized that rare examples of transfusion malaria will arise.

[Careful studies such as this both add to our knowledge of the natural history of human malaria and point to the increasing risk of transfusion malaria under modern conditions of travel.] *J. H. Walters*

COBBAN, K. McL. **Malaria in the Partially Immune Adult Nigerian.** *J. Trop. Med. & Hyg.* 1960, Oct., v. 63, No. 10, 233–7, 1 fig.

The subjects of this investigation were adult Africans resident in Ibadan, Western Nigeria, where malaria is holoendemic. Initial blood examination of 250 subjects, 20 to 30 years of age, all of whom were afebrile and without symptoms, with no recent history of fever, yielded a parasite rate of 6·8% (*Plasmodium falciparum* 15, *P. malariae* 2). 17 other subjects were examined weekly for periods varying from 12 to 30 weeks, during which no antimalarial drugs were taken. Of 326 blood smears examined 20 (6·1%) showed parasites (*P. falciparum* 18, *P. malariae* 2). Only 2 out of 9 persons attending for 6 months had no detectable parasitaemia at any time.

Febrile episodes (temperature 100°F. or over) were accompanied by a parasite rate of at least 66·4%. Fever almost invariably subsided within 24 hours after a single dose of 600 mgm. of chloroquine base. The attack rate was only 11% per annum.

In approximately half the patients who complained of fever and general malaise pyrexia was absent or minimal and the parasite rate only 17·5%. The author contends that there is no justification in classifying and treating such cases as malaria.

[See also this *Bulletin*, 1958, v. 55, 974.] *G. Covell*

SALEM, H. H. **A Review of the Modern Trends in Antimalarial Therapy.** *Alexandria Med. J.* 1955, Jan., v. 1, No. 1, 72–100. [Numerous refs.]

BAMI, H. L. **Recent Advances in Synthetic Antimalarials.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1960, May–July, v. 8, Nos. 3/4, 65–79. [Numerous refs.]

GRAY, H. F. **An Analysis of the Eradication Concept.** *Mosquito News.* 1960, Mar., v. 20, No. 1, 14–23.

The object of this address, given at the 15th Annual Meeting of the American Mosquito Control Association in April 1959, was to examine the concept of eradication of a vector transmitted disease (primarily malaria) as contrasted with that of control. The author presumes that in an eradication programme the sole measure advocated is an attack on the adult vector by means of insecticides, whereas in a control programme the use of several methods of attack is envisaged, including the spraying of insecticides, according to their applicability under specific conditions. He points out that there are conditions in which the

use of insecticides alone may fail and urges the inclusion of environmental techniques, based on vector ecology, in present and future campaigns of eradication.

But, as stressed by Dr. Louis WILLIAMS, whose comments are included in a series of footnotes to the paper, the use of insecticides is today the basic professional technique for control just as it is for eradication. "Eradication is merely setting up an operational methodology which carries control to the nth degree, controls 'completely' the last focus of infection by removing it." Residual insecticides are the *principal* professional techniques because of their low cost and ease of application, but not the *one and only*. Where residuals do not work, other professional techniques are in use, and with success. For instance, chemotherapy is often employed to supplement the use of insecticides in the later stages of a campaign, and in certain areas where the application of insecticides has been found impracticable, good results have been reported by the use of medicated salt. *G. Covell*

BRUNO-SMIRAGLIA, Calogera. Ricerche citogenetiche sull'*Anopheles labranchiae* in Sicilia. **[Cytogenetic Studies on *Anopheles labranchiae* in Sicily]** *Riv. di Parassit.* Rome. 1960, Mar., v. 21, No. 1, 65–70. [12 refs.] English summary.

D'ALESSANDRO *et al.* [*Bull. World Health Organization*, 1957, v. 16, 859; this *Bulletin*, 1958, v. 55, (6) and 1076] have reported a correlation between the presence of an inversion in the left arm of the third chromosome of *Anopheles labranchiae atroparvus* and selection with DDT, the homozygous inverted and heterozygous order being found in greater frequency in a DDT-selected stock. In 1956, in the Cavallaro district of Sicily, there was a considerable increase in the numbers of *A. labranchiae* in spite of the annual treatment with DDT. Tests showed, however, that susceptibility to insecticides was normal. An examination of the chromosomes of *A. labranchiae* from this district was made against the possibility of an eventual outbreak of resistance. One larva out of 485 larvae examined cytogenically was found to be heterozygous for the particular zone along the III S arm identical with the *A. l. atroparvus* inversion mentioned. Larvae from other areas of Sicily were examined and all showed the standard order of chromosomes. *A. labranchiae* in Sardinia, similarly examined by FRIZZI *et al.* [this *Bulletin*, 1958, v. 55, 626], showed only one larva with the heterozygous inversion in a total of 76 examined.

A further investigation of the chromosomes of *A. labranchiae* showed that there was little chromosomal heterogeneity among 145 larvae, 20% showed an asynapsis in the X chromosome—regions 3/4 to 4/5—and 6% an asynapsis in the region 43/44 of the III S chromosome.

The author compares these results with work on *A. l. atroparvus*, which retains its heterogeneity under laboratory conditions, with *A. gambiae* [*ibid.*, 1957, v. 54, 918] which shows a greater number of inversions when reared at higher temperatures, and with *A. evansae* which is more adaptable ecologically than *A. argyritarsis*, the former having greater chromosomal variability. She suggests that the homogenity—albeit not an absolute one—of *A. labranchiae* is due to the fact that the heterozygous condition does not give any

selective advantage, and also corresponds to the fact that this vector has not shown any DDT resistance in Sicily. *C. Elizabeth Jackson*

KUHLOW, F. **Bio-Assays on DDT Sprayed Walls in Native Huts.** *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1960, v. 11, No. 1, 57–60.

The increased incidence of mosquitoes in and around African huts (in Northern Nigeria) which had not been sprayed for 6 months prompted an investigation into the residual effectiveness of DDT under field conditions. The toxicity of DDT deposits on mud surfaces was determined by means of the conical-type WHO bioassay test kit [this *Bulletin*, 1959, v. 56, 491] with 1- to 3-day-old *Aedes aegypti* adults from a normal laboratory colony.

Bioassays were carried out in a number of villages where hut dwellings had normally been treated with insecticides at six-month intervals as part of the Northern Nigerian Mass Malaria Control Campaign [see *ibid.*, 1958, v. 55, 863]. 10 huts in each village were chosen to be included in the experiment. Each hut included in the trial had had a similar history of treatment with DDT.

The results, tabulated in detail, are expressed as percentage mortality of the test insect under bioassay, with reference to the time elapsed since the last spraying with DDT. 99·3% average mortality (for all the huts) was recorded 6 days after spraying. The average mortality for 2, 3 and 4 months after spraying was 83%, 82% and 80%, respectively. Thereafter the average mortalities dropped sharply so that 5 and 6 months after spraying they were 52% and 42%, respectively. Control bioassays made in recently built and unsprayed huts gave negligible kills. DDT was shown to be almost equally toxic to *Aedes aegypti* and *Anopheles gambiae* when employed in the WHO adult test kit. It is, therefore, suggested that the results of the bioassays probably give a good measure of the effectiveness of DDT deposits against *A. gambiae*, which is one of the most important local vectors of malaria.

The loss of efficacy of DDT residues, as measured by the bioassay tests, is cited as one of the main causes for the increased prevalence of mosquitoes 5 and 6 months after spraying. However, the author takes care to point out that the results were obtained under artificial conditions and cannot generally be applied to field conditions without first giving consideration to further entomological findings. *B. C. Fine*

FREDERIKSEN, H. **Malaria Control and Population Pressure in Ceylon.** *Pub. Health Rep.* Wash. 1960, Oct., v. 75, No. 10, 865–8, 1 chart. [12 refs.]

The history of Ceylon is frequently cited as an example of the demographic effects of malaria control. A drop in the general death rate from 20·3 in 1946 to 14·3 in 1947 has been attributed to extension of the residual campaign. But spraying was confined to malarious areas, whereas 62% of the population lived in non-malarious areas, and the most dramatic reduction in death rate occurred during the second half of 1946, at a time when spraying had covered only 18% of the population. Actually, between the second semesters of 1945 and 1946, deaths from all causes declined by 24% in non-malarious areas and 26% in malarious areas. Except during the malaria epidemic of 1934–35, the death rate in Ceylon has been declining since 1905.

The population density of non-malarious areas was 17 times as great as that of the malarious areas, which in olden times were the most populous and productive parts of the island. With malaria eradication this disparity can be redressed, the effect being a reduction rather than an increase of population pressure. *B. B. Waddy*

GABALDON, A., BERTI, A. L. & GUERRERO, L. **Venezuela and the World Malaria Eradication Program.** *Riv. di Parassit.* Rome. 1959, Dec., v. 20, No. 4, 263–72.

The nation-wide campaign against malaria in Venezuela, begun in 1945, was based on the indoor residual spraying of houses with DDT, and had as its aim the eradication of malaria from the entire country. The authors review the data collected during the campaign and compare them with those furnished by other countries engaged in similar programmes. Emphasis is laid on the importance of determining a base line of malaria prevalence before the programme starts and to measure it periodically. Malaria eradication is fundamentally an epidemiological problem.

In Venezuela 155 sq. km. of territory with 520,000 inhabitants are still infected, owing to the behaviouristic resistance of two of the vector anophelines, *Anopheles aquasalis* and *A. núñez-tovari.* Total eradication has been effected over an area of 400,000 sq. km. with a population of 4½ million.

Except for the 4 islands of Barbados, Martinique, Puerto Rico and Tobago, no country of the tropical zone has accomplished total eradication of malaria. Eradication has been effected in 8 European countries, but in none of these was the area infected as large as that from which the disease has been eliminated in Venezuela.

In Venezuela the criterion of eradication is total absence of indigenous cases for 3 or more consecutive years as proved by adequate active and passive surveillance. The intensity of the search for malaria cases is shown by the number of slides examined per 1000 inhabitants. Venezuela occupies the first place with more than 10% of the population examined during the year. The occurrence of sporadic cases indicates a relapse of more than 3 years with confirmation of absence of transmission by intensive search for cases. Probably owing to this very strict definition the number of sporadic cases in Venezuela is much lower than that found in other countries. *G. Covell*

GIGLIOLI, G. **Fifteen Years Experience in Malaria Eradication in British Guiana. Maintenance Policies and Residual Problems.** *Riv. di Parassit.* Rome. 1959, Dec., v. 20, No. 4, 279–88, 1 fig.

British Guiana covers an area of 83,000 square miles, with a population of 518,000, of whom 450,000 are settled on a narrow strip extending for approximately 200 miles along the Atlantic coast, where there is extensive cultivation of sugar cane and rice. The remaining 68,000 are scattered over the interior, along the tidal reaches of the larger rivers, on the Pakaraima Plateau and on the Rupununi Savannahs. Most of the interior is covered by equatorial rain forest.

The chief malaria vector is *Anopheles darlingi*, while *A. aquasalis* maintains a mildly endemic form of malaria on the lower tidal reaches of the rivers in the North-West District, bordering on the Delta of the Orinoco. In contrast with *A. darlingi* which is highly anthropophilic and an indoor biter, *A. aquasalis* feeds chiefly on cattle and is only a vector of importance in the absence of livestock.

The malaria problem in the British Guiana coastlands was one of the gravest in the Western Hemisphere. The spraying of houses with DDT was begun in 1945 at a time when very detailed data on the epidemiology of malaria and the habits of the local vectors had already been acquired.

Malaria eradication has been achieved throughout the whole coastal strip and spraying operations have been discontinued in this area since 1952. In the interior eradication appears to have been achieved in all the more densely and permanently inhabited areas along the tidal reaches of the rivers. Since these are all forest areas where surveillance is difficult and expensive, spraying operations have been continued up to the present on an annual basis.

The more remote parts of the western section of the territory have a population of about 30,000, scattered over a wide area. All inhabited areas are covered by DDT spraying on an annual cycle, but owing to difficulties of communication supervision has not always been adequate. Malaria has been reduced to a very low level, but eradication has never been completely achieved. Failure of DDT spraying in these remote areas is attributable either to exophilic habits of carriers other than *A. darlingi* or to habitual frequent displacements of the Amerindian population to situations where residual methods are inapplicable. It is thought that PINOTTI's medicated salt technique [this *Bulletin*, 1959, v. 56, 122] may offer a solution to this problem and a plan for the medication of all salt supplies proceeding to the North West District, to the Upper Cuyuni, Mazaruni and Potaro Rivers and to the Rupununi District has been prepared in cooperation with the Pan-American Health Organization and WHO. It is hoped that this will be put into operation in the near future. *G. Covell*

HECHT, O. & HERNÁNDEZ CORZO, J. Reseña de las investigaciones sobre la irritación de anofelinos por el contacto con superficies cubiertas con DDT. **[Studies on the Irritation of Anophelines by Contact with Surfaces Treated with DDT]** *CNEP Bol.* Mexico. 1960, Apr.–June, v. 4, No. 2, 93–106, 2 figs. [19 refs.]

The first part of the paper reviews earlier work on the irritant effect on mosquitoes of surfaces treated with DDT. Methods of measuring this effect are described, with particular details of the technique described by BARRERA *et al.* [this *Bulletin*, 1960, v. 57, 788]. This method depends on estimation of the average number of flights among groups of mosquitoes, confined on the paper impregnated with DDT as supplied for resistance tests by WHO. A further way of using these impregnated papers was a slightly different apparatus of Hecht *et al.* (Report of Seminar on Susceptibility of Insects to Insecticides, Pan-American Health Organization, p. 304–317, WHO: 1958). This was used to measure the average time necessary to provoke the first flight in individual mosquitoes. A third apparatus is described (and figured) in the present article which allows the same observation to be made and also the time required to

paralyse ("knock down") the mosquito. The following results may be compared:—

Anopheles		No. of flights per 20 mins.	Minutes to first flight: Hecht 1958	Minutes to first flight: This paper	Minutes for knock-down
albimanus	unfed	67·3	11·1	15·5	87·5
„	fed	16·6	19·4	29·0	128·0
aztecus	unfed	45·0	22·8	38·0	324·0
„	fed	35·2	18·0	45·0	405·0
quadrimaculatus	unfed	25·8	24·9	48·0	254·0
„	fed	1·2	38·9	86·0	461·0
WHO Paper: % DDT:—		1	2	4	4

Despite the differences in apparatus and some inconsistencies [*e.g.* longer time to first flight on 4% DDT than on 2% DDT] the over-all picture of irritability in the three mosquito species seems fairly clear. Unfed, their order of decreasing irritability is *albimanus*> *aztecus*> *quadrimaculatus*. After feeding, the order of *albimanus* and *aztecus* may be reversed, because all fed mosquitoes are more sluggish, but the decrease in irritability with *aztecus* is not so great as in the other two.

The time necessary to cause knock-down in various species, fed or unfed, is roughly correlated with the average time necessary to cause first flight [so that both are perhaps some indication of susceptibility levels]. But this relation did not hold with individual females within a batch. *J. R. Busvine*

Tolbert, M. G. & McGhee, R. B. **The Effect of Alloxan Diabetes on *Plasmodium berghei* Infection in Albino Rats.** *J. Parasitology*. 1960, Oct., v. 46, No. 5, 552–8, 2 figs. [23 refs.]

Attention was first drawn by Bass and Johns [this *Bulletin*, 1913, v. 2, 556] to the importance of hyperglycaemia due to diabetes in malaria infections. It is known that alloxan will produce diabetes in rats and the effect on *Plasmodium berghei* infections in these animals after treatment with the substance has now been studied. To produce diabetes in rats an aqueous solution of alloxan was given intraperitoneally in doses of 80 to 180 mgm. per kgm. The course of infection with *P. berghei* was first followed in untreated rats, in those receiving alloxan without giving rise to diabetes and in a further group rendered diabetic, so that on average more than 340 mgm. % glucose was present in the blood. The course of infection in diabetic rats differed significantly from that in the other two groups. Alloxan diabetes caused inhibition of infection with resultant lower parasitaemia. The administration of alloxan in absence of diabetes did not affect the course of infection. These results differ from those found in canaries infected with *P. cathemerium* and rendered diabetic [*ibid.*, 1928, v. 25, 262; see also *ibid.*, 1940, v. 37, 509; 1953, v. 50, 383]. *J. D. Fulton*

DASGUPTA, B. **Lipids in Different Stages of the Life Cycles of Malaria Parasites and some other Sporozoa.** *Parasitology*. 1960, Nov., v. 50, Nos. 3/4, 501–8, 2 figs. [12 refs.]

The author has studied by cytochemical methods the lipids present in 3 species of malaria parasites at different stages of development and the results were compared with those of similar studies on other stages of protozoa. In the case of *Plasmodium gallinaceum*, examinations were made in material from mosquitoes and in blood smears of experimentally infected chicks. *P. cynomolgi* was also studied on the infected glands and stomachs of mosquitoes, in infected blood of monkeys, as well as in frozen sections of liver in the case of pre-erythrocytic forms. Studies of blood smears from a naturally infected monkey were made in the case of *Hepatocystis kochi*. Gametocytes of *Hepatozoon sciuri* and of *H. balfouri* were also studied in blood smears of their respective hosts. For the study of sporogonic stages in *Eimeria stiedae* oöcyst walls from infected rabbits were first ruptured. Fixation, staining and sectioning of tissues was carried out by conventional methods. It was found that lipid material was present in oöcysts of the plasmodia studied and stained with different intensity at the various stages of development. There was also much lipid material in pre-erythrocytic stages of *P. cynomolgi*. The erythrocytic stages of *Plasmodium* and of *Hepatocystis* did not stain with Sudan dyes, whereas positive results were obtained with gametocytes of *Hepatozoon* in the host cell. Staining with Sudan dyes was also apparent in unsporulated oöcysts of *Eimeria stiedae* but not in those which had sporulated. *J. D. Fulton*

DASGUPTA, B. **Polysaccharides in the Different Stages of the Life-Cycles of Certain Sporozoa.** *Parasitology*. 1960, Nov., v. 50, Nos. 3/4, 509–14, 3 figs. [12 refs.]

Sporadic attempts have been made by earlier authors to demonstrate polysaccharides in erythrocytic and exo-erythrocytic stages of certain malaria parasites [this *Bulletin*, 1947, v. 44, 938; 1953, v. 50, 197; 1956, v. 53, 285]. The application of the periodic-Schiff reagent to this problem is recorded in the present investigation for *Plasmodium gallinaceum, P. cynomologi* and *Hepatocystis kochi* as well as in other Sporozoa described above. Mosquito stages and blood stages of *Plasmodium* in the respective hosts were studied. *Theileria parva* was available in old sections of spleen and lymph glands of cattle and *Hepatozoon sciuri* in infected fleas and in squirrels, while *H. balfouri* was obtained from jerboas and other members of the genus from infected frogs. Glycogen was not detected in malaria parasites by cytochemical techniques, but was seen in piroplasma and *Hepatozoon*. Polysaccharides were seen in the oöcyst walls of *Plasmodium* and in gametocyte capsules, sporoblast capsules and polar areas of gametocytes of certain *Hepatozoon*. *J. D. Fulton*

BISHOP, Ann & MCCONNACHIE, Elspeth W. **Further Observations on the *in vitro* Development of the Gametocytes of *Plasmodium gallinaceum*.** *Parasitology*. 1960, Nov., v. 50, Nos. 3/4, 431–48. [13 refs.]

Various theories have been put forward to explain the emergence of gametocytes of plasmodia from red blood cells. From earlier experiments the present

authors came to the conclusion that certain factors of importance in this phenomenon were present in chick plasma [this *Bulletin*, 1956, v. 53, 1101]. The present investigation describes the effect of horse serum and rabbit plasma on emergence. The strain of *Plasmodium gallinaceum* used was maintained by mosquito passage in chicks and many gametocytes were present. Usually 0·5 ml. heavily parasitized, heparinized blood was added to 4·5 ml. of the fluid under test and after washing by centrifugation the parasites were suspended in the same volume of fluid. The freshly drawn blood was examined over a period of 15 to 60 minutes or longer after withdrawal and the number of gametocytes counted with the aid of a microscope in drops of the suspension under coverslips at room temperatures. Tris buffer was added to the salt solutions made isotonic with bird blood to give a final *p*H of 8.

Since chick plasma and serum were so favourable for emergence of gametocytes, horse serum and rabbit plasma were next tried and proved satisfactory. It was also shown that sexual development was satisfactorily completed in horse serum.

Plasma from hyperimmune birds behave like normal plasma.

Experiments with different ions showed that gametocytes could emerge from corpuscles and males exflagellate normally in presence of solutions containing Na, Cl and HCO_3 ions. In presence of NaCl, KCl or $NaHCO_3$ alone gametocytes did not behave normally. It appeared that the Na ion could not be satisfactorily replaced by the K ion when Cl and HCO_3 ions were also present. Various combinations of other ions were also studied.

The composition of the solutions used, each made isotonic with bird blood, are shown in an Appendix. *J. D. Fulton*

SERGENT, Ed. Infection latente et prémunition dans le paludisme des Passereaux à *Plasmodium relictum*. [**Latent Infection and Premunition in Malaria of the Passerine Birds due to** *Plasmodium relictum*] *Riv. di Parassit.* Rome. 1959, Dec., v. 20, No. 4, 389–95.

In this paper the author brings together observations on immunity in avian malaria carried out by himself and his late brother (Et. SERGENT) during the last 60 years, in the course of which about 6,000 canaries infected with *Plasmodium relictum* were studied. The general course of the infection can be best summarized in the following free translation of the author's own words:

> None of these canaries exhibited absolute innate immunity. In all of them there was an acute attack, reflecting the violent struggle between the host's organism and the plasmodia, terminating fatally in 6% of the cases. During the attack the parasites are swarming in the red cells. In those canaries that survived the attack, the morbid symptoms disappeared, but the infection persisted in a dormant state. During this period the plasmodia continue to grow slowly in the internal organs, reappearing in the peripheral blood only rarely and in single numbers, for a few hours . . . As long as this latent infection and the condition of premunition persist the host is resistant to reinfection with parasites of the same species, but after the parasites disappear the host again becomes susceptible to infection.

The duration of the latent infection was studied in hundreds of canaries in the course of several years, by microscopical examination of the blood and of

internal organs, and it was found that it persisted for upwards of 8 years in some cases, *i.e.* during the whole life span of these birds. In some four dozen birds carrying latent infections for 6 years, re-inoculation with homologous parasites 1–48 months after the primary attack produced a scanty superinfection, which failed to develop an acute attack. *C. A. Hoare*

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed:— epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

ASHCROFT, M. T. **A Comparison between a Syringe-Passaged and a Tsetse-Fly-Transmitted Line of a Strain of** *Trypanosoma rhodesiense*. *Ann. Trop. Med. & Parasit.* 1960, Apr., v. 54, No. 1, 44–53, 2 figs. [16 refs.]

In 1934 a strain of *Trypanosoma rhodesiense* was isolated from a patient in Tanganyika. The strain was maintained for more than 20 years in 2 substrains or lines [see also this *Bulletin*, 1960, v. 57, 224], one of which (*T*) was transmitted cyclically through sheep by tsetse, while the other (*W*) was syringe-passaged through mice and rats.

Parallel observations and experiments with these two lines revealed striking differences between them. Thus line *W* was invariably monomorphic in all its hosts, while *T* remained polymorphic. In a number of experiments on volunteers, *T* produced infections, whereas *W* proved to be non-infective to man. The two lines were infective to animals in various degrees: *W* was less virulent than *T* to monkeys, rabbits, guineapigs and sheep, but more virulent to rats. Animals which had recovered from infection with *W* could be reinfected with *T*, but not with the homologous line, indicating a difference in the capacity for antigenic variation. While *T* underwent typical development in tsetse, *W* was unable to do so but sometimes merely persisted in the gut for a few days. Finally, *W* responded more readily to treatment with tryparsamide than *T*.

C. A. Hoare

SCHNEIDER, J. Le diagnostic de la trypanosomiase africaine (maladie du sommeil) en France. [**Diagnosis of African Trypanosomiasis in France**] Reprinted from *Presse Méd.* 1960, Mar. 19, v. 68, No. 14, 529–30.

———. Traitement de la trypanosomiase africaine (maladie du sommeil). [**Treatment of African Trypanosomiasis**] *Ibid.*, May 7, No. 23, 881–3.

FROMENTIN, H. Sensibilité aux trypanocides, *in vivo* et *in vitro*, d'une souche de *Trypanosoma gambiense* normale et des lignées arséno-résistantes. [**Sensitivity to Trypanocidal Drugs, *in vivo* and *in vitro*, of a Normal Strain of *Trypanosoma gambiense* and of Arsenic-Resistant Lines of the Same**] *Bull. Soc. Path. Exot.* 1960, May–June, v. 53, No. 3, 517–25. [14 refs.]

These studies were made with a virulent laboratory strain of *Trypanosoma gambiense* ("Eliane") which had been isolated in 1952 and maintained by syringe passage. Clones were made from this by infection of mice with single trypanosomes. The DS50 [suppressive dose] was defined as the intramuscular dose (mgm./20 gm.) which removed trypanosomes from the blood of 50% mice for at least 4 days. The clone of normal trypanosomes killed mice in 4½ days, and the DS50 was 3 mgm. tryparsamide, 0·0036 mgm. Mel. B, 0·005 mgm. pentamidine (lomidine) and 0·05 mgm. suramin. Trypanosomes of this clone were exposed *in vivo* to tryparsamide (4 mgm./20 gm.) for 24 hours and sub-inoculated into a new mouse, giving the strain called S4; from this 4 clones were isolated S4 I, II, III and IV. The DS50 of tryparsamide for these strains was:— S4, 14 mgm.; clones S4 I, 20 mgm.; S4 II, 18 mgm.; S4 III, 16 mgm.; S4 IV, 6 mgm. Three subclones made from S4 I also had a DS50 of 20 mgm. After passage through mice for 6 months, the resistance of S4, S4 II, and S4 III had not varied significantly but that of S4 IV had fallen from 6 mgm. to 4 mgm.

The resistance of S4 IV was reinforced by a further exposure of 24 hours *in vivo* to 22 mgm. tryparsamide, yielding line V. This had a DS50 of 22 mgm. and three subclones of it had DS50 of 24 mgm. (clone VI) and 22 mgm. (clones VII and VIII). Line V was exposed again (3rd exposure) to 25 mgm. and yielded line IX which had a DS of 26 mgm. Line IX was exposed again (4th exposure) to 30 mgm. and yielded line X which had a DS50 of 65 mgm.; 11 months later the DS50 of X had fallen to 18 mgm. Although X was initially almost maximally resistant to tryparsamide, it was still normally sensitive to Mel B, to suramin and (almost) to pentamidine. The reactions of some of these strains *in vitro* to tryparsamide (which is inactive *in vitro*) and to pentamidine were also investigated.

During the discussion, the various theories for the origin of drug-resistant organisms are described; the observed facts can be explained in various ways. Changes in the drug resistance of a strain of trypanosomes do not alter its virulence for rodents. *F. Hawking*

BAKER, J. R. **Trypanosomes and Dactylosomes from the Blood of Fresh-Water Fish in East Africa.** *Parasitology*. 1960, Nov., v. 50, Nos. 3/4, 515–26, 2 text figs. & 5 figs. on pl. [19 refs.]

COVA GARCIA, P. & SUAREZ, M. A. Estudio de los triatominos en Venezuela. [**Study of Triatomid Bugs in Venezuela**] *Publicaciones de la Division de Malariologia*. Ministerio de Sanidad y Assistencia Social. Caracas. 1959, No. 11, 209 pp., illustrated. [Numerous refs.]

This work contains descriptions of the morphology of triatomid bugs and two keys, one pictorial, to the genera *Psammolestes* (1 species), *Rhodnius* (4

species), *Panstrongylus* (2 species), *Cavernicola* (1 species), *Eratyrus* (2 species) and *Triatoma* (3 species). Each of the species, except *Psammolestes*, is illustrated by a full page photograph or drawing and the distribution of the species in Venezuela is given in detail, being illustrated also by maps. The section on distribution occupies most of the work, nearly 50 pages being devoted to locality records of *R. prolixus*.

There is also a discussion of the distribution of the bugs in relation to the geographical features of the country. Five geographical areas are separated and *R. prolixus*, *R. pictipes* and *T. maculata* have been recorded in all five. *R. prolixus* is a domestic species and is the most important vector of Chagas's disease in Venezuela. A map shows a concentration of records of this species in the north of the country but this is the region most heavily populated by man.

Over 100 titles are given in the bibliography. *B. R. Laurence*

Okumura, M., De Brito, T., Da Silva, L. H. P., Da Silva, A. C. & Netto, A. C. **The Pathology of Experimental Chagas's Disease in Mice: I. Digestive Tract Changes, with a reference to Necrotizing Arteritis.** *Rev. Inst. Med. Trop. São Paulo.* 1960, Jan.–Feb., v. 2, No. 1, 17–28, 10 figs. [36 refs.]

The authors describe in detail the pathological changes observed in the alimentary tract of mice infected with *Trypanosoma cruzi*, and examined between the 21st and 170th days of infection. Macroscopic inspection revealed dilatation of the bowel in 20% of the animals, but the typical " megacolon " condition was absent. During the early stages of the disease, the peritoneum showed signs of fat necrosis, probably connected with pancreatitis. In all cases there was evidence of focal myositis affecting the smooth muscles of the bowel, especially near the anus, while striated muscles were affected by interstitial myositis. The lesions resembled those encountered in the oesophagus (" megaoesophagus ") and colon (" megacolon ") of patients suffering from Chagas's disease. A common feature of the experimental infection was a necrotizing arteritis affecting chiefly the small arteries under the peritoneal lining and sometimes also the aorta and coronary artery. The lesion is regarded as a form of allergic angiitis, possibly resulting from antigen(*T. cruzi*)—antibody reactions.

The pathological changes are depicted in a series of photomicrographs.

C. A. Hoare

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

Corradetti, A. I focolai italiani di kala azar e il problema della leishmaniosi nel Sud Europa. [**Italian Foci of Kala Azar and the Problem of Leishmaniasis in Southern Europe**] *Parassitologia.* Rome. 1960, Apr.–Aug., v. 2, Nos. 1/2, 95–8.

The English summary appended to the paper is as follows:—

" The results of ten years of epidemiological investigations on leishmaniasis in Italy are briefly referred. The zone investigated by the author is the

Apennine region from the Maritime Alps (Imperia, Genova) to the Gargano Peninsula.

"Oriental sore is endemic along the Adriatic coast from the Molise provinces to Rimini-Cervia, as well as along the hills of Emilia from Rimini to half-way between Modena and Reggio Emilia. Kala azar is sporadic all over the territory investigated, with some major zones of incidence such as the following: Gargano peninsula, Argentario, Pienza, Genova and Imperia provinces.

"The classification according to the pharyngeal characters, of 8,109 phlebotomus caught (mostly in houses and stables) in the different parts of the region under study led to the conclusion that *Ph. perfiliewi* is the vector of oriental sore and *Ph. perniciosus*, the vector of kala azar.

"During these investigations the author got the impression that no sufficient attention is paid by local physicians to kala azar, owing to its low incidence and its sporadic occurrence. Nevertheless the importance of the problem cannot be denied, as the disease is almost exclusively an infant disease, and many children have died, the diagnosis being established too late. He emphasizes the need of more correlated studies on kala azar among the countries of Southern Europe and Mediterranean region, in order to determine a line of prophylaxis which can be both active and economically feasible."

Núñez Montiel, A. E. & Mayz Vallenilla, O. Kalazar infantil en el Estado Zulia. Primer caso. [**First Case of Infantile Kala Azar in Zulia State, Venezuela**] *Archivos Venezolanos Puericult. y Pediat.* 1960, Jan.–June, v. 23, Nos. 75/76, 71–95, 5 figs. [11 refs.] English summary.

Shekhanov, M. B. & Suvorova, L. G. [**Natural Foci of Cutaneous Leishmaniasis in the South-West of Turkmenistan**] *Med. Parasit. & Parasitic Dis.* Moscow. 1960, v. 29, No. 5, 524–8. [In Russian.]

The English summary appended to the paper is as follows:—

"In the south-western part of Turkmenistan there were found intensive foci of cutaneous leishmaniasis of the rural type. The principal reservoir of the infection is represented by Rhombomys opimus Licht, which is infected with Leishmania tropica in 35.3% of cases, while the infection rate of Meriones erythrounus Gray comprised 6·7%. The fauna of sand fly carriers is represented by 6 species, of which 76·2% constitute Phlebotomus arpaklensis. About one half (48%) of the individuals of this species proved to be infected with L. tropica. Three other species Ph. caucasicus, Ph. sergenti and, for the first time in USSR —Ph. sumbaricus were also found to be carriers of infection. The highest degree of infection in Rhombomys opimus Licht, and in sand flies was observed in the vicinity of human settlements."

Sampaio, S. A. P., Godoy, J. T., Paiva, Lamartine, Dillon, Neusa L. & Lacaz, C. da S. **The Treatment of American (Mucocutaneous) Leishmaniasis with Amphotericin B.** *Arch. Dermat.* 1960, Oct., v. 82, No. 4, 627–35, 12 figs. [14 refs.]

Since the discovery of amphotericin B in 1955 numerous reports have come to hand on its beneficial effect in the treatment of systemic mycoses, including South American blastomycosis [this *Bulletin*, 1960, v. 57, 180].

American (mucocutaneous) leishmaniasis is still a serious problem in Brazil and Latin America, and the treatment so far has been unsatisfactory on account of relapses and resistance to customary therapy. Consequently the hitherto unsuspected effectiveness of amphotericin B in treatment constitutes a great advance. The usefulness of this drug was verified simultaneously by FURTADO and LACAZ *et al.* in 1959 (*Rev. Paulista Med.*, 1959, v. 55, 86). The clinical results were confirmed in *in vitro* studies by SILVA (personal communication) on the inhibitory effect against leptomonas in cultures of *Leishmania brasiliensis* and *L. donovani.*

The present paper reports experiences with this drug in 20 cases of American leishmaniasis. These patients had multiple clinical forms—3 with muco-cutaneous lesions, 7 with mucosal lesions only, and 10 with dermal lesions alone. The clinical manifestations varied from papules and ulcers to vegetative, infiltrating ulcerous or verrucous forms in cases of long standing. The youngest patient was 10, the oldest 55. The duration ranged from 33 years to 2 years in 15 patients and from 1 year to 45 days in 5; these 5 had had no previous treatment, but the other 15 had undergone some.

The drugs employed had been Fouadin, Glucantime and Eparseno, an arsphenamine compound.

The diagnosis was based on clinical manifestations, the Montenegro test and histopathological examinations. The Montenegro test was positive in all of the patients. Histopathological examinations made in all cases except one, showed histiocyte and plasma cell infiltration and Leishman bodies.

Amphotericin B was dissolved in 500 ml. of 5% dextrose and injected by slow intravenous drip over a period of about 6 hours, on alternate days. The first dose was 25 mgm., followed by 50 mgm., and in some patients 75 mgm., with an average of 1 mgm./kgm. to 1·25 mgm./kgm. body weight. Prednisone (10 mgm.), triamcinolone (8 mgm.) and dipyrone (500 mgm.) were given beforehand to control side effects. Recently, prednisolone suspension (10 mgm.) was mixed with the infusion to control local phlebitis. Electrocardiograms were taken before amphotericin therapy was begun and after one month of treatment.

All patients, with one exception, were cured by intravenous administration of the drug. In one, only moderate improvement was noted after 1,800 mgm. of intravenous amphotericin, but this was discontinued and 300 mgm. given by local infiltration, with complete success.

In 15 patients therapeutic results were controlled by biopsy at the end of treatment. There was a marked disappearance of the cellular infiltration and fibrosis. In one patient the initial infiltrate became tuberculoid. Leishman bodies were not found except in one patient in whom these organisms were very numerous initially and were still identifiable.

The level of blood urea increased, but returned to normal at the end of treatment.

All patients were followed up as much as possible. One relapsed, but subsequently recovered with complete healing after 1,175 mgm. It remains to be determined how long a follow-up period is necessary to evaluate the occurrence of relapses according to the doses employed.

It may be that verrucous isolated lesions may respond satisfactorily to local infiltration which could then be regarded as auxiliary to intravenous treatment.

8 case histories are given and the effects of treatment shown in several photographs. *Philip Manson-Bahr*

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

CHASTEL, C. & RIDET, J. Rickettsioses et néorickettsioses en Haute-Volta. Intérêt de la microagglutination des rickettsies sur lame en zone intertropicale. **[Rickettsial and Neorickettsial Infections in the Upper Volta Area. Value of the Slide Microagglutination Test in the Intertropical Region]** *Bull. Soc. Path. Exot.* 1960, Mar.–Apr., v. 53, No. 2, 180–209. [13 refs.]

This paper presents observations on 77 patients, seen during the last 5 months of 1959, whose sera contained agglutinating antibodies at significant titres for one or more rickettsial antigens. The patients included 49 Africans and 28 Europeans, all from Bobo-Dioulasso or its immediate neighbourhood.

From the clinical standpoint, the forms of illness affecting the patients were classified as follows: (1) typhoidal [*forme typhique*] 16 cases; (2) pseudo-influenzal 7; (3) exanthematic 9; (4) latent [*forme inapparente*] 3; (5) miscellaneous, including irregular fevers, joint complaints, pneumopathies, cardiovascular affections, and nephritic or hepatonephritic affections 21; (6) neuropsychiatric and neurological 11; (7) ophthalmological 4; (8) otorhinolaryngological 4; (9) surgical 2. Nearly all the patients were treated with chloramphenicol, some also receiving corticoids ; there were 3 deaths.

Slide microagglutination tests gave the following positive results with the rickettsial antigens indicated: with antigens of murine type, or both murine and epidemic types, 36 sera; with boutonneuse and epidemic types 35; with Q fever antigens 2; with neorickettsial (Q 18) antigens 2; with 3 antigenic types 2. The results of Weil-Felix tests supported a diagnosis of rickettsial infection in 69 patients, although titres were generally low. While it is recognized that some of the conditions seen may have been due to causes other than rickettsiosis, operating in persons whose antibodies were related to previous infections, the authors consider that most of the illnesses were of rickettsial origin.

It is concluded that the slide microagglutination test with rickettsial antigens has provided evidence of the existence of endemic rickettsioses on a large scale in the region of the Upper Volta. This test is considered to be of notable value in the diagnosis of clinical syndromes which do not at first sight appear to be due to rickettsial infection, and in the epidemiological study of rickettsioses. The results are tabulated in full and several case histories are given.

R. S. F. Hennessey

BOVARNICK, Marianna R. **Incorporation of Acetate-1-C^{14} into Lipid by Typhus Rickettsiae.** *J. Bacteriology.* 1960, Oct., v. 80, No. 4, 508–12. [13 refs.]

"Typhus rickettsiae, incubated in a medium similar to that used for demonstration of amino acid incorporation, are capable of incorporating acetate-C^{14}. The amount of acetate incorporated is small but is in marked contrast to the practically negligible uptake of acetate by heated rickettsiae or by particles from normal yolk sac. The incorporated acetate-C^{14} is found exclusively in the lipid

fraction of the cells, in contrast to incorporated glycine-C^{14}, which is found almost entirely in the protein fraction."

SPARROW, Hélène & HUET, M. L'élevage du pou au laboratoire. [**Rearing of Lice in the Laboratory**] *Arch. Inst. Pasteur de Tunis.* 1960, Sept., v. 37, No. 3, 369–82, 3 text figs. & 30 figs. on 15 pls. [21 refs.]

The authors describe in considerable detail a way of rearing lice involving daily feeds on human subjects. The method (and that of rectal inoculation of lice for preparation of vaccine) is illustrated by 30 photographs. [However, there seem to be no advances in principle over the methods described by BUXTON (this *Bulletin*, 1947, v. 44, 860). Since the object seems to be production of large numbers, for vaccine preparation, etc., it seems likely that the method of rearing on rabbits might be more satisfactory (see PSHENICHNOV and NOSKOVA, *ibid.*, 1957, v. 54, 1306, and SMITH and EDDY, *ibid.*, 1954, v. 51, 1117).]

J. R. Busvine

KUMADA, N. **Epidemiological Studies on** *Trombicula* (*Leptotrombidium*) *pallida* **in Japan, with special references to its Geographical Distribution, Seasonal Occurrence and Host-Parasite Relationship.** *Bull. Tokyo Med. & Dental Univ.* 1959, June, v. 6, No. 2, 267–91, 2 figs. [67 refs.]

Sporadic cases of scrub typhus have been reported in Japan in areas where *Trombicula akamushi* and also *T. scutellaris*, which has been shown to be a vector locally of Shichito fever, have never been collected. *T. pallida* has been found naturally infected in Korea [this *Bulletin*, 1958, v. 55, 494] and this species is a widely distributed, suspected vector in Japan.

This paper discusses the biology of *T. pallida* and its probable relation to the transmission of scrub typhus. The principal host in Japan appears to be *Microtus*, but *T. pallida* has been found in addition on a wide range of hosts, rodents, insectivores, birds and man.

B. R. Laurence

BURGDORFER, W. & LACKMAN, D. **Identification of** *Rickettsia rickettsii* **in the Wood Tick,** *Dermacentor andersoni*, **by means of Fluorescent Antibody.** *J. Infect. Dis.* 1960, Sept.–Oct., v. 107, No. 2, 241–4, 2 figs. [11 refs.]

Rickettsiae which stained specifically with immune serum for *Rickettsia rickettsi* labelled with fluorescein isothiocyanate were present in smears from the intestinal diverticulae of 50–90% of nymphal and adult *Dermacentor andersoni* from batches which had fed 14–115 days previously, as larvae or nymphs, on guineapigs infected with *R. rickettsi*. Staining was regularly inhibited by previous treatment of smears with unlabelled homologous antiserum. Suspensions of 22 ticks found positive by the fluorescent antibody technique all produced clinical or serological signs of Rocky Mountain spotted fever infection when injected into guineapigs, while suspensions of 35 negative ticks failed to do so. It was noted that the intensity of rickettsial staining was consistently greater in smears from nymphs than in those prepared from adults several weeks after moulting.

R. S. F. Hennessey

Fraser, P. K., Hatch, L. A., Carmichael, R. J. & Evans, A. D., with the technical assistance of J. M. R. Forster & J. E. Goodings. **Q Fever in Naval Personnel.** *Lancet*. 1960, Oct. 29, 971–3. [10 refs.]

A naval rating, who had recently returned to the R.N. Hospital, Haslar, Hampshire, after a 3 days' survival training course in the Black Mountains area of Wales, developed an attack of atypical pneumonia. Complement-fixation tests carried out on his sera against 7 types of upper respiratory viral antigens showed a rise in antibody to *Rickettsia burneti* from 1 in 5 on the 7th day to 1 in 320 on the 19th day. The occurrence of this undoubted case of Q fever led to an investigation of sera from some 600 other men who had undergone a similar course of training.

After an initial period of 5 weeks spent in a shore establishment in Wiltshire, each class was sent for 3 days into the Black Mountains, where the men made their base in a ruined farm-house, from which they marched, climbed and slept in the surrounding mountains. This area was heavily contaminated by sheep and cattle excreta and many animals underwent parturition in and around the ruined buildings. The period of occupation of the area by successive courses was from June to November; lambing had ceased in April. The summer months of this year (1959) were notably dry, and both the buildings and countryside were dusty.

Sera were obtained from 368 men who had been in the mountains between June 13 and September 8. Of the 11 courses in which they were included, 2 successive groups showed a high incidence of positive antibody titres to *R. burneti* (1 in 10 or more in a single specimen was taken to indicate past infection). These two groups, who lived in the Black Mountains from early June to late July, showed incidences of positive antibody titres of 61% and 47% respectively. Earlier and later groups showed positive incidences of 5–14%.

There could be little doubt that infections were acquired in Wales. There was no outbreak of Q fever in Hampshire during the summer of 1959, and among many patients admitted to a naval hospital there suffering from upper respiratory tract infections, only 1% showed antibody to *R. burneti*. The mode of infection could not be determined. Dust from the environment of the ruined farm, and from the clothing of the returning men, did not infect guineapigs. Ticks were not implicated though the men complained of being bitten by a number of other insects during their 3 days mountain training period. Blood samples from a number of sheep and cattle in the area showed no evidence of infection. [Local rats were not investigated.]

50 men from among the serologically positive group were re-tested after a further interval of 3 months. In all but 11 a significant drop in *R. burneti* antibody titre had occurred, and all were in good health. [See also this *Bulletin*, 1960, v. 57, 577.] *J. H. Walters*

Jadin, J., Léonard, J. & Thomas, J. Néo-rickettsies et avortement chez les bovidés en Belgique. **[Neorickettsiae and Abortion in Bovines in Belgium]** *C.R. Soc. Biol.* 1960, v. 154, No. 5; 1127–8.

The authors recently found agglutinating antibodies for *Rickettsia burneti* (titres of 1 in 40 to 1 in 80) in the sera of 107 (63·3%) out of 169 cows which had aborted, all 169 sera having given negative reactions for brucellosis [this

Bulletin, 1960, v. 57, 801]. They now report results of tests on a further series of 314 sera; 32 contained antibodies at a minimum titre of 1 in 20 for the neorickettsial strain Q 18 [originally isolated in France, in 1956, from a ewe which had aborted (*Bull. Acad. Vét. de France*, 1956, v. 29, 393)]; 63 agglutinated both Q 18 and *R. burneti*; 143 agglutinated *R. burneti* alone.

From these and other results, it appears that, in Belgium, antibodies for *Brucella abortus* were present in about 30% of sera from cows which aborted; antibodies for neorickettsiae associated with abortion in ewes in about 18%; and antibodies for *R. burneti* in about 39%. It is concluded that, in addition to brucellosis and Q fever, infection with neorickettsiae is a factor in the aetiology of bovine abortion in Belgium. *R. S. F. Hennessey*

MANDRAS, A., ADDIS, S. & PINTUS, L. Sulla frequenza di anticorpi contro *C. burneti* nella popolazione rurale della Provincia di Sassari. [**On the Frequency of Complement-Fixing Antibodies against *C. burneti* in the Rural Population of the Province of Sassari**] *Igiene Moderna*. 1960, May–June, v. 53, Nos. 5/6, 232–7.

The English summary appended to the paper is as follows:—

"The investigators performed the complement fixing reaction on 1000 samples of sera from direct market-gardeners and farmers of the Province of Sassari.

"Significant antibody titres were found in 21.6% of the subjects from all areas in the province, with maximum values (34.09%) in old subjects and minimum ones (11.74%) in individuals between 11 and 20 years of age."

[See this *Bulletin*, 1959, v. 56, 429.]

HENCNER, Z. & BUCZYNSKA-HENCNEROWA, Stanisława. Badania nad występowaniem dodatnich odczynów serologicznych w kierunku gorączki Q. [**Studies on the Occurrence of Positive Serological Tests for Q Fever**] *Ann. Univ. Mariae Curie-Skłodowska*. Lublin. Sect. D. 1959, v. 14, 173–80. [17 refs.] English summary.

The authors, in Poland, examined large numbers of sera from human beings, domestic animals and small mammals (mostly rodents, but including one bat) for the presence of complement-fixing antibodies to *Rickettsia burneti*. Henzerling and Nine Mile antigen were used in parallel. The number of sera giving titres of 1 in 16 or more may be summarized thus:

		Henzerling		Nine Mile	
Human (2039)		1 in 16	1 in 32	1 in 16	1 in 32
Farmers	562	3	1	1	1
Slaughterhouse employees	157	2	–	1	–
Hospital patients	110	1	–	1	1
Specimen for Wassermann test	1210	1	–	–	–
Total		7	1	3	2
Domestic Animals (1680)					
Slaughtered animals	478	3	1	2	–
Sheep	168	–	–	–	–
Calves	473	–	–	–	–
Cattle (Lublin)	372	–	–	–	–
Cattle (Kielce)	189	5	3	6	2
Total		8	4	8	2
Small mammals (292 in 10 species)		4	2	4	1

(In the case of the small mammals the titres recorded were 1 in 20 and 1 in 40.)

It will be noted that the calves and sheep and the cattle from Lublin province were negative.

The results are stated to show a higher percentage of positive sera than were found in a survey in 1952. *H. J. O'D. Burke-Gaffney*

McLean, D. M., Rance, C. P. & Walker, Selma J. **Q Fever Infections in an Ontario Family.** *Canadian Med. Ass. J.* 1960, Nov. 19, v. 83, No. 21, 1110–11. [11 refs.]

"Two children who lived some 30 miles north-west of Toronto contracted febrile infections after exposure to sheep at their home. They lived in a district adjacent to dairy herds in which Q fever is endemic. A rising titre of complement-fixing antibody to *Coxiella burnetii* antigen in successive sera from one patient and an elevated antibody titre in convalescent phase serum from the other patient strongly suggested infection with Q fever."

[See this *Bulletin*, 1960, v. 57, 892.]

Dwyer, R. St. C., Tonge, J. I., Hoffman, T. R., Scott, W., Derrick, E. H. & Pope, J. H. **A Remarkable Outbreak of "Q" Fever.** *Med. J. Australia.* 1960, Sept. 17, v. 2, No. 12, 456–8.

Between October and December 1958, all 6 members of a family who owned and worked on a pineapple farm near Palmwoods, Queensland, suffered from Q fever. All 6 were admitted serially to hospital with high fever and headache, none showed a rash and each recovered within 5 days of the institution of chloramphenicol treatment. A relapse occurred in one instance but responded quickly to a further course of the antibiotic.

The diagnosis was established in 2 patients by the demonstration of a rising titre of complement-fixation antibody to *Rickettsia burneti*, while in the other 4 a single convalescent specimen of serum showed CF antibody at a significant titre of 1 in 32 to 1 in 64. Appropriate tests for typhus, typhoid, leptospirosis, brucellosis and psittacosis were all negative.

The interest of this outbreak lies in the intensity of the epidemicity and the absence of cattle and sheep, the usual source of human infections, from the farm. There was evidence that *R. burneti* was enzootic in cattle in the district, but there was no direct contact between the patients and the cattle of their neighbours, while the dairy herd which supplied raw milk to them was free from infection and no other customer had become ill.

All indications pointed to the farm as the locus of infection, and wild animals living on it were next investigated. Bandicoots, which were plentiful in the neighbourhood of the only water-hole and a small forested area of seepage, were trapped. Suspensions of pooled organs from each animal were inoculated intraperitoneally into weanling mice and into guineapigs. 3 serial intraperitoneal passages of the spleens of inoculated mice were performed and the spleens were searched for rickettsiae by taking smears (stained with Giemsa) from them. A single passage was carried out in guineapigs, and the sera of the first passage animals were examined for CF antibodies. In this way proof of infection was obtained in 3 out of 20 bandicoots (*Isoodon macrourus*). Similar investigations carried out on an opossum and 5 rats (*Rattus rattus*) gave negative results.

A sample of " meatworks fertilizer " which had been used on the farm for the past 10 years, and which was subjected to steam at 300°F. during preparation, was similarly investigated with negative results.

A large collection of ticks of the genera *Ixodes* and *Haemaphysalis*, obtained from the trapped bandicoots, opossums and rats were also examined biologically for rickettsiae, but with negative results.

The authors conclude that the human disease was acquired from a reservoir in the local bandicoots, and that exceptional activity associated with enlarging the water-hole, near which numbers of bandicoots had their burrows, accounted for the 100% attack rate in this one family. Infection was probably direct and not mediated by ticks. *J. H. Walters*

Rychlo, A. & Pospišil, R., with the technical assistance of V. Sidorová & E. Vranayová. Zur Morphologie und Pathogenese des experimentellen Q-Fiebers beim Meerschweinchen. [**Histopathology and Pathogenesis of Experimental Q fever in the Guineapig**] Reprinted from *Pathologia et Microbiol.* Basle. 1960, v. 23, No. 4, 489–503, 7 figs. [36 refs.]

The authors have studied the pathogenesis of Q fever in 100 guineapigs infected by various routes with the Henzerling strain of *Rickettsia burneti* and killed at intervals up to 6 months after infection. At the height of the disease the lungs, testicles, liver, adrenals, spleen and lymph nodes showed diffuse interstitial inflammation; a characteristic feature was the presence of large vacuolated reticuloendothelial cells containing colonies of *R. burneti*, which eventually burst and liberated the organisms. Animals which recovered from the infection showed emphysema and complete destruction of the seminal tubules.
D. J. Bauer

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

De Groot, Carmen J., Metzger, J. F., Smith, C. W. & Hoggan, M. D. **Demonstration of Yellow Fever Virus in Human Cell Culture by Immunofluorescence.** *Virology*. New York. 1960, Oct., v. 12, No. 2, 317–20, 2 figs.

17D strain yellow fever virus was grown in human embryonic intestine, human amnion (FL) and Chang's liver cells. Hyperimmune serum was prepared by immunizing rabbits with chick embryo virus, and then conjugated with fluorescein isothiocyanate. Cultures on coverslips were fixed and stained at intervals along with uninfected controls. Other conjugated sera were also used as controls.

Specific fluorescence appeared in the perinuclear region of a few cells 48 hours after infection and by 96 hours many cells showed perinuclear fluorescence. Subsequently the number of cells showing fluorescence did not appear to increase. The fluorescence could be blocked by previous treatment of the cells with unconjugated yellow fever antiserum. The supernatant fluid in the cultures titred 3·0 log mouse LD50 after 48 hours and a maximum of 5·0 log after 72 hours which was maintained till 120 hours. The 3 cell lines gave similar results. *C. E. Gordon Smith*

BEARCROFT, W. G. C. **Electron-Microscope Studies on the Liver Cells of Yellow-Fever-Infected Rhesus Monkeys.** *J. Path. & Bact.* 1960, Oct., v. 80, No. 2, 421–6, 9 figs. on 6 pls. [16 refs.]

6 rhesus monkeys (*Macaca mulatta*) without demonstrable antibody to yellow fever were inoculated with 8–30,000 mouse LD50 of the Asibi strain of yellow fever. They survived 94–130 hours after injection and serial liver biopsies were made. The tissue was fixed in cold 1% osmium tetroxide and embedded in a mixture of methacrylates. The normal appearance is described.

In infected livers the changes were focal. The earliest change was an increase of granular material in the nuclear sap while the nucleolus became enlarged, distorted and vacuolated. Clusters of similar granular material were seen just outside the nuclear membrane and this material accumulated in the cytoplasm. The granules were about 14·5 mμ and later aggregated to form rosettes of 5–12 granules 96–100 mμ in diameter. Early in infection a small amount of virus was seen near the nucleus but virus particles accumulated and became displaced toward the periphery until the cytoplasm was packed with them. The particles were spherical, 56–61 mμ in diameter. Virus particles were never seen in the nucleus, mitochondria or endoplasmic reticulum. Shortly after the increase in granular material in the nuclear sap, aggregates of dense material formed in the nucleus and increased in size often near the nucleolus to form the Torres inclusion body. While the nucleus was discharging granular material into the cytoplasm the mitochondria showed progressive swelling and thinning so that the cristae were clearly seen. The membranous elements of the endoplasmic reticulum diminished in amount and progressively enlarging droplets of lipid were seen in the cytoplasm. The findings are shown in 9 clear electron microphotographs. [For cytological and cytochemical studies by the author, see this *Bulletin*, 1961, v. 58, 190.] *C. E. Gordon Smith*

DENGUE AND ALLIED FEVERS

THOMAS, L. A. & EKLUND, C. M. **Use of the Complement Fixation Test as a Diagnostic Aid in Colorado Tick Fever.** *J. Infect. Dis.* 1960, Sept.–Oct., v. 107, No. 2, 235–40.

The Florio strain of Colorado tick fever virus was used. Complement-fixing (CF) antigen was prepared by acetone-ether extraction of infected suckling

mouse brain. Primary incubation was overnight at 4°C. Among 49 sera collected from 42 patients before the 20th day of disease none had CF antibody: 2 of them had neutralizing indices of 56 and 229. CF antibody was first detected 20 days after onset and persisted in 1 patient for as long as 260 days. 6 of 18 sera collected 2–4 weeks after onset had CF antibody as did 15 of 18 4–6 weeks after onset, 18 of 21 6–14 weeks after onset and 12 of 16 14–37 weeks after onset. Neutralizing antibody appeared earlier: 3% of sera collected up to 2 weeks after onset and 89% of those 2–4 weeks after onset had neutralizing antibody. 14 patients developed neutralizing but no CF antibody in 2 or 3 serial serum specimens examined from each. [See also this *Bulletin*, 1947, v. 44, 712.]

C. E. Gordon Smith

RABIES

Sulkin, S. E., Allen, R., Sims, Ruth, Krutzsch, P. H. & Kim, C. **Studies on the Pathogenesis of Rabies in Insectivorous Bats. II. Influence of Environmental Temperature.** *J. Exper. Med.* 1960, Oct. 1, v. 112, No. 4, 595–617, 3 figs. [31 refs.]

The Thompson strain of canine street virus and the 59VI3B strain isolated from naturally infected *Myotis lucifugus* were used. *Tadarida mexicana* (Mexican free-tailed bats) were inoculated intramuscularly in the chest with 8,000 mouse intracerebral LD50 of street virus.

The body temperature of resting bats is close to environmental temperature in the range 2–37°C. In 77 *T. mexicana* maintained at 10°C. 3 were found dead 12, 13 and 103 days after inoculation and virus demonstrated in brain or brown fat or both; one healthy animal killed after 31 days had virus in brown fat, but 4 and 2 killed respectively 43 and 103 days after infection had not. In 137 *T. mexicana* maintained at 29°C. 16 bats died 22–51 days after infection, 6 bats with symptoms were killed 22–26 days after, and 10 healthy bats were killed 22–75 days after; all had virus in brain or brown fat or salivary gland or all three. 26 *T. mexicana* were kept at 10°C. for 43 or more days, then at 29°C.: 1 which died after 70 days, 2 which were killed with symptoms after 142 days, and 1 healthy bat killed after 51 days had virus in brown fat and brain. In these groups infection was thus demonstrated in 5, 24 and 15% respectively. When the virus in the organs was titrated, brain titres ranged from $<1{\cdot}0$–$3{\cdot}5$ log, in brown fat from $<1{\cdot}0$–$3{\cdot}0$ log and in salivary gland from $<1{\cdot}0$–$2{\cdot}7$ log.

The little brown bat (*M. lucifugus*) [this *Bulletin*, 1960, v. 57, 29] is more susceptible. In a similar experiment 40 *M. lucifugus* were kept at 5°C.: 2 died 19 and 29 days after infection and 1 healthy bat was killed after 20 days: all had virus in brown fat and brain or in either brain or salivary gland alone. 97 were kept at 29°C.: 25 died after 9–29 days, 7 with symptoms were killed 13–28 days after, and 3 healthy bats were killed after 14–20 days: virus was found in one or more of the three organs. 47 were kept at 5°C. for 14 days, then at 29°C.: 10 died after 22–40 days, 3 with symptoms were killed after 35–37 days, 9 healthy bats were killed after 22–40 days: all had virus in one or more of the

three organs. Infection was demonstrated in 7·5, 36 and 49% respectively of these groups.

Hibernation at low temperatures delays the multiplication of the virus. This was confirmed by detailed titration of the organs at intervals in bats held at different temperatures. Similar results were obtained with the virus isolated from bats but this strain showed a greater affinity for brown fat than the canine strain. In bats which have hibernated, the infection of the salivary gland appears to be more frequent and of higher titre than the infection in animals which have not hibernated. *C. E. Gordon Smith*

Ado, A. D. & Kanchurin, A. K. **Problem of the Allergenic Properties of Fermi Rabies Vaccine.** *Problems of Virology*. London. 1960, v. 5, No. 1, 13–19. [15 refs.] [Translated from Russian.]

A state of enhanced sensitivity in man and in various animals to repeated injections of antirabies vaccine prepared from nervous tissue has been observed and reported by numerous investigators. To determine the respective roles played by nervous tissue and by fixed rabies virus in the formation of the allergenic properties of Fermi rabies vaccine was the object of the experiments detailed in this paper.

In these experiments the Fermi vaccine employed was of 2 types, one prepared from rabbit brain, the other from sheep brain; for the controls use was made of a 5% suspension of normal rabbit brain in 1% phenol solution. The control suspensions and the experimental batches of vaccine were prepared simultaneously and, on analysis, the various preparations were found to have a protein content of 80–90 mgm. per ml. The allergenic properties of the vaccine were studied in guineapigs; animals of 250 gm. weight were sensitized with 1 or 2 subcutaneous injections of 0·2 ml. of vaccine, and 12–14 days thereafter they were given a challenge injection of the vaccine into the femoral vein in a dose of 0·2 ml. per 100 gm. body weight, *i.e.* 0·5 ml. For the challenge injection both the type of vaccine given to sensitize the animals and the other type of Fermi vaccine (rabbit- or sheep-brain) were employed and in some experiments a 5% suspension of normal rabbit brain in 1% phenol solution was used. In other experiments the challenge injection of the vaccine used to sensitize the animals was carried out after preliminary desensitization. Desensitization was effected by the subcutaneous injection of 1 ml. of Fermi vaccine 2 hours before the challenge injection and, in the control experiments, it was carried out with the other type of vaccine or with a 5% suspension of normal rabbit brain in 1% phenol solution. In all cases the allergenic properties of the various components of the vaccine were estimated according to the intensity of the anaphylactic shock on intravenous challenge after preliminary sensitization of the animals with the Fermi vaccine under test.

4 series of experiments were carried out on 68 guineapigs. In series I, the effect of the intravenous injection of 0·5 ml. of vaccine (rabbit- or sheep-brain) into 7 healthy unsensitized animals was observed. Immediately after the injection all 7 showed weak general tremor and slight lassitude, which disappeared in 2–3 minutes. From the results of control investigations with intravenous injections of a 5% suspension of normal rabbit brain in 1% phenol or saline solution and of a 1% phenol solution alone, it was concluded that the response indicated

above was due to the presence of phenol in the inoculum and to the toxic action of the nervous tissue itself. In the subsequent experiments this type of response to the intravenous injection of vaccine was not taken into account.

In series II and III the allergenic properties of Fermi rabbit vaccine were studied. In series II, 33 guineapigs were sensitized with 2 doses, each of 0·2 ml. of the vaccine, a 1-day interval separating the doses. Of 13 animals, which received intravenous challenge with the same vaccine, 12 showed severe anaphylactic shock and died 1½–2 minutes after the injection; 1 showed distinct anaphylactic reaction, with bronchospasm. In 8 animals, after preliminary desensitization with the same vaccine, there was no response to the subsequent intravenous challenge; in 8 other animals, desensitized with normal rabbit brain suspension, there was little or no effect on the raised response to intravenous challenge with the rabbit-brain vaccine, 6 showing severe anaphylactic shock and 2 less severe, but definite, anaphylactic symptoms. The remaining 4 guineapigs gave only a weak anaphylactic reaction to a challenge injection of normal rabbit brain suspension in 1% phenol. Differences in the antigenic and allergenic properties of the vaccine under study and those of normal rabbit brain having thus been demonstrated, a third series of experiments was carried out to determine whether these differences were due merely to the presence of virus in the vaccine preparation.

In series III, therefore, 14 guineapigs sensitized to rabbit-brain vaccine were challenged intravenously: 8 with rabbit-brain vaccine, after preliminary desensitization with sheep-brain vaccine, and 6—non-desensitized—with sheep-brain vaccine. All 8 desensitized animals showed the same severe anaphylactic shock in response to challenge with the rabbit-brain vaccine as had the 13 non-desensitized guineapigs similarly challenged shown in series II. None of the 6 non-desensitized animals challenged with sheep-brain vaccine showed any signs of shock.

In series IV, devised to study the allergenic properties of Fermi sheep-brain vaccine and in which 14 animals were used, similar results to those shown above were obtained.

From these studies it would appear that the virus itself does not produce allergenic properties in the vaccine independent of the link with the cell it invades, otherwise it would have been immaterial whether the virus was present in the brain of the rabbits or of the sheep. The authors conclude that the allergenic properties of Fermi rabies vaccine depend essentially on the presence in the inoculum of nerve tissue modified by the action of fixed rabies virus or on a complex antigenic product of interaction between virus and brain tissue.

G. Stuart

SOAVE, O. A. & LENNETTE, E. H. **Infectious Canine Hepatitis coincidentally associated with Vaccination against Rabies.** *Amer. J. Pub. Health.* 1960, Oct., v. 50, No. 10, 1582–7.

"An outbreak of illness associated with prophylactic inoculation against rabies is shown to have been due to the virus of infectious canine hepatitis. The virus was recovered by inoculation of monolayer cell cultures of dog kidney with suspensions of tissues from sick dogs.

"The vaccine employed consisted of low egg passage Flury strain virus. The three incriminated lots of vaccine tested did not contain demonstrable hepatitis

virus and the outbreak is attributed to infected dogs among the large numbers that were inoculated at the various immunization clinics.

"There was no evidence that the attenuated rabies virus in the vaccine was etiologically involved. The undesirability of using vaccines contaminated with extraneous microorganisms is discussed."

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

FYODOROV, V. N. **The Question of the Existence of Natural Foci of Plague in Europe in the Past.** *J. Hyg., Epidemiol., Microbiol. & Immunol.* Prague. 1960, v. 4, No. 2, 135–41. [20 refs.]

DODIN, A. & BRYGOO, E. R. Activité succinodéshydrogénasique de *Pasteurella pestis*, souche E.V. II. Étude manométrique. [**Succinodehydrogenase Activity of *Pasteurella pestis* Strain EV. II. Manometric Study**] *Arch. Inst. Pasteur de Madagascar.* 1960, v. 28, 17–18.

The following is a translation of the authors' summary:—

Results obtained by a colorimetric method were confirmed by a volumetric method with regard to the capacity of *P. pestis* to degrade sodium succinate. This enzymatic activity was maintained for a long time when the suspension was kept at + 4°C. *H. J. O'D. Burke-Gaffney*

VOELCKEL, J. & VARIÉRAS, G. La répartition des espèces *R. norvegicus* et *R. rattus* à Douala. (3e note.) [**Distribution of Species of *Rattus norvegicus* and *R. rattus* at Douala**] *Méd. Trop.* Marseilles. 1960, Sept.–Oct., v. 20, No. 5, 625–9.

See also this *Bulletin*, 1960, v. 57, 31.

KARTMAN, L. **The Role of Rabbits in Sylvatic Plague Epidemiology, with special attention to Human Cases in New Mexico and Use of the Fluorescent Antibody Technique for Detection of *Pasteurella pestis* in Field Specimens.** *Zoonoses Res.* New York. 1960, Sept. 19, v. 1, No. 1, 1–27, 1 fig. [Numerous refs.]

This is a well written and well documented paper by an experienced field investigator of sylvatic plague which is entirely suitable as the opening contribution to a new journal: *Zoonoses Research.*

Although there are numerous references in the enormous literature on plague which suggest that rabbits become infected during epizootics and may convey the infection to man, these mammals had not been considered to be of epidemiological importance either in local sylvatic epizootics or as potentially dangerous to man in the Western United States of America before 1950 [this *Bulletin*, 1950, v. 47, 847]. Nevertheless in New Mexico 5 out of 9 human cases were associated with wild rabbits and in 1960 2 human cases of plague occurred in south-eastern New Mexico where there was an epizootic involving cotton-tail rabbits. There is evidence where infections appear to have been associated with, for instance, an epizootic among wood-rats which had passed to rabbits before the human infections occurred. It is of particular interest to note that the fluorescent antibody technique had proved to be of value in field surveys in identifying animals infected with plague found dead in the field.

It may be of historical interest to record that in GREENWOOD's obituary notice of BACOT [this *Bulletin*, 1924, v. 21, 673], he refers to the East Anglian plague outbreaks before the Great World War in which Bacot found rabbits infected with plague, although epizootics, other than those related to rats, are not mentioned. *H. J. Bensted*

MEYER, K. F. Fortschritte in der Erforschung und Behandlung der Pest. [**Progress in the Investigation and Treatment of Plague**] *Schweiz. med. Woch.* 1960, Dec. 3, v. 90, No. 49, 1392–8, 1416.

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

i. ABOU-GAREEB, A. H. **A Comparative Cholera Study between Bustee Areas of Wards 14 and 18 in Calcutta City.** *Calcutta Med. J.* 1960, Apr., v. 57, 116–26, 4 maps on 2 pls.

ii. ————. **Trends of Mortality from Cholera in Calcutta City Wards during Study Period of 21 Years.** *Ibid.*, June, 181–8, 8 maps on 2 pls.

iii. ————. **On the Epidemiology of Cholera in Calcutta City during the Year 1959.** *Ibid.*, July, 219–26, 7 maps on 4 pls.

iv. ————. **The Detection of Cholera Endemic Centres in Calcutta City.** *Ibid.*, Oct., No. 10, 343–53. [13 refs.]

These 4 papers record the results of a study undertaken at the All-India Institute of Hygiene and Public Health, Calcutta, sponsored by the World Health Organization.

i. A statistical study was made in the *bustee* (shanty dwelling) area of 2 wards of Calcutta of records relating to the period 1938–1958. There was a significant

difference between the 2 wards as regards certain social, economic and environmental aspects which have their repercussion on the prevalence of severe diarrhoeal diseases, the most important of which is cholera.

ii. Studies based on the statistical analysis of cholera mortality data over 2 different periods of 21 years each showed that the disease is diminishing in intensity in the majority of the city wards. For the whole city endemic cholera incidence has been lowered from 44 to 21 per 100,000 of the population. The figures for the peripheral wards, which have the higher proportion of *bustee* population, were higher than those in the central parts of the city.

iii. Analysis of data from the statistical section of the Calcutta Corporation and the records of patients admitted to the cholera wards of the city hospitals for the year 1959 showed that the great majority of patients diagnosed as having cholera were discharged after a period not exceeding 6 days, after which an appreciable number might still be excreting *Vibrio cholerae* and thus remaining infective. The admission of patients diagnosed as having cholera together with a variety of other diarrhoeal diseases exposes other patients to the risk of cross-infection.

iv. A study of figures relating to cholera patients admitted to the city hospitals over the 3-year period 1957–59 correlated with field observations on the localities from which they originated indicated a particular prevalence of the disease in certain sections of streets, roads and lanes. A common feature of such areas is that the inhabitants share a communal mode of life under conditions of overcrowding and defective sanitation, characterized by an unsafe water supply, improper sewage and refuse disposal and heavy fly breeding. In Ward 18, the most heavily affected in the city, 17% of latrines were found to be connected either directly or indirectly to a water tank used as a source of domestic supply. *G. Covell*

SIDDHICHAI, P. & GRAYSTON, J. T. **Epidemiologic Studies of the 1958 Cholera Epidemic in Bangkok, Thailand.** *Amer. J. Hyg.* 1960, Sept., v. 72, No. 2, 149–61, 3 figs.

Cholera is not endemic in Thailand, but has occurred there from time to time in epidemic form. One such outbreak began in May 1958, after a period of 10 years' freedom from cholera. By the end of July 9,952 cases had been reported. The epidemiological aspects of the epidemic were studied by the Ministry of Health of the Thai Government in cooperation with a team from the United States Naval Medical Research Unit, Taiwan. The investigations were limited to the provinces of Bangkok and Dhonburi, where the epidemic began and the incidence was highest. A case fatality rate of 16% during the first 2 weeks of the epidemic was cut to less than half by rapid hospitalization and immediate rehydration. The attack rate in Dhonburi, which has an extensive canal system, was 2½ times greater than in Bangkok.

All ages were involved, the highest attack rates being in young children and young adults. The greatest number of cases by occupation groups occurred among labourers and unemployed. Multiple cases in the same household were uncommon and the majority of patients had good water supply and sewage disposal systems in their homes. No conclusions as to the mode of spread could be drawn from the available information but the data suggested that many of the

infections occurred outside the houses. A search for carriers among 243 household contacts of cholera patients resulted in only 3 cultures positive for *Vibrio cholerae*. The evidence suggested that cholera vaccination modified the severity of the illness. *G. Covell*

WATTEN, R. H. & PHILLIPS, R. A. **Potassium in the Treatment of Cholera.** *Lancet*. 1960, Nov. 5, 999–1001, 2 figs. [20 refs.]

The authors note that 50 years ago Sir Leonard ROGERS advocated the infusion of a hypertonic saline solution which included 0·4 gm. (5·4 mEq.) of potassium chloride per litre in the treatment of cholera. An excessive loss of potassium in the stools was demonstrated during the 1947 cholera epidemic in Egypt, and to combat this the inclusion of 6·7 mEq. of potassium in each litre of infusion fluid was recommended. Workers in Calcutta also have in recent years advised the administration of potassium salts by mouth provided the urinary flow be adequate [this *Bulletin*, 1955, v. 52, 363].

The study on which this paper is based was carried out during the 1958 cholera epidemic in Bangkok [*ibid*., 1961, v. 58, 62, and above]. In order to relate the faecal and urinary losses of water and electrolytes to changes in the blood and tissue fluids, nothing was allowed to the patients by mouth during the first 24 hours of treatment, all fluid and salts being given intravenously.

Severely affected cholera patients passed a total faecal volume of 3–17 litres in this period, and the total fluid loss from the bowel in the 2–4 days of their disease amounted to 10–35 litres. The mean potassium concentration of the faeces during the first 24 hours was 16 mEq. per litre [1·2 gm. approx.], the total loss of this salt in both faeces and urine ranging from 50 to 245 mEq. [4–19 gm. approx.]. Throughout the whole period of diarrhoea, this loss might amount to 400–700 mEq. [30–54 gm. approx.], which would be about 15–30% of the total available potassium in the body.

Since the faecal potassium content varies inversely with the faecal volume, measurement of the latter may give no true indication of the amount of potassium actually being lost. Moreover, potassium depletion may give rise to paralytic ileus, in which a large quantity of fluid and electrolyte may be pooled in atonic and dilated coils of gut, and, since it does not reach the exterior, may thus invalidate conclusions drawn from measurements of faecal volume. This is the probable explanation of the "cholera sicca" syndrome. For this reason serial estimations of the plasma specific gravity, rather than the external fluid loss, give a surer guide to rehydration. [Whole-blood specific gravity and haematocrit determinations may lead to erroneous calculations of the required volume of replacement fluid, since cholera usually attacks the poorest social elements, who are often anaemic.] The authors publish a striking histogram showing the faecal excretion each 20 minutes of a patient under infusion with normal saline containing 2% sodium bicarbonate at a constant rate. Despite this, faecal volume decreased to zero after 3 hours, but rose again promptly after 40 mEq. of potassium had been infused, and had presumably restored the tone of the gut.

Alkalosis is frequently associated with hypokalaemia, especially when saline and bicarbonate solutions only have been infused.

In addition to paralytic ileus, potassium depletion may exert two other dangerous pathogenic effects. The first is myocardial depression, the second a

specific type of hydropic degeneration of the epithelium of the renal tubules [see RELMAN and SCHWARTZ, *Amer. J. Med.*, 1958, v. 24, 764; also, this *Bulletin*, 1960, v. 57, 1062]. The paper includes serial electrocardiograms of a patient which show initial depression of T-waves in all leads, slightly improved on rehydration and correction of acidosis, but only reverting to normal after infusion of potassium.

The authors advise that, under epidemic conditions when electrocardiographic and laboratory control of potassium replacement is impossible, 10 mEq. [0·75 gm.] of potassium chloride should be added to each litre of maintenance fluid. No potassium should be added to the replacement fluid, since its rapid infusion may cause cardiac arrhythmia. As long as diarrhoea continues it is safe to infuse potassium in the above amounts even if the renal function is unknown, but on the cessation of diarrhoea, intravenous potassium should be discontinued if the renal function is unsatisfactory or cannot be assessed. Once diarrhoea is controlled, provided there are no renal complications, 10 ml. three times daily by mouth, of a solution containing 100 gm. each of potassium citrate, acetate and bicarbonate, in 1 litre of water [3 gm. of potassium salts] may be given in a glass of water.

[This is a clear and helpful paper which is commended to those concerned in the treatment of epidemic cholera.] *J. H. Walters*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

REES, C. W., KEY, Iris D. & SHAFFER, J. G. **Some Quantitative Data on the Growth of *Entamoeba histolytica* from Single-Cell Isolations in Microcultures.** *Amer. J. Trop. Med. & Hyg.* 1960, Mar., v. 9, No. 2, 162–7, 3 figs. [19 refs.]

The authors describe experiments on the growth of "pure lines" of *Entamoeba histolytica*. For this purpose single amoebae were removed with the aid of a micromanipulator from a culture in Shaffer-Frye medium and transferred to microtubes containing the same medium. Although the conditions were standardized, there was considerable variation in the number of progeny produced in different cultures. For some unknown reason, all attempts to isolate pure lines in conventional test tubes by inoculation of individual amoebae had failed, but growth could be obtained in them by subinoculation of amoebae from microcultures.

It is suggested that cultures of pure lines provide the means for studying the genetic and metabolic characters of *E. histolytica*. *C. A. Hoare*

REEVES, R. E., SCHWEINFURTH, Dorothy I. & FRYE, W. W. **The Cultivation of *Entamoeba histolytica* with Radiation-Inactivated Bacterial Cells.** *Amer. J. Hyg.* 1960, Sept., v. 72, No. 2, 211–17. [11 refs.]

The authors have previously reported on growth of *Entamoeba histolytica* with a single bacterium in presence of inhibitory amounts of penicillin. The bacterium *Bacteroides symbiosus* was however able to grow and multiply when the drug was removed. It has now been found possible to inactivate the bacterial cells by means of radiation so that they will still support amoebic growth in absence of ability to multiply.

The composition of the trypticase-thiomalate medium and its preparation have been described previously [this *Bulletin*, 1959, v. 56, 830]. The bacterial cells were irradiated from a Cobalt 60 source delivering about 8,000 roentgens per minute while the temperature was kept below 15°C. It was found that approximately 1 million roentgens were required to bring about complete inactivation of 1 billion cells. The following is the authors' summary.

"1. Growth and multiplication of *Bacteroides symbiosus* cells could be completely suppressed by Co^{60} irradiation without loss of the ability of these cells to stimulate and support the growth and multiplication of *Entamoeba histolytica*.

"2. Three strains of *E. histolytica* were brought into culture apparently free from viable associated organisms, and they have been maintained in culture with inactivated bacterial cells for many serial transplants.

"3. Ameba multiplication in the experimental cultures with radiation-inactivated bacterial cells was as good as or better than that occurring in the routine MS–F culture with penicillin-inhibited bacterial cells.

"4. The amebae ingested the inactivated bacterial cells as readily as they did penicillin-inhibited cells." *J. D. Fulton*

NEAL, R. A. **Enzymic Proteolysis by *Entamoeba histolytica*; Biochemical Characteristics and Relationship with Invasiveness.** *Parasitology.* 1960, Nov., v. 50, Nos. 3/4, 531–50, 10 figs. [36 refs.]

The author has measured the proteolytic activity of various strains of *Entamoeba histolytica* on different substrates by methods previously described by him [this *Bulletin*, 1957, v. 54, 429] in order to throw some light on the invasive characters of this protozoon. Live amoebae as well as extracts from frozen and thawed organisms grown in bulk were used in these tests. Bacteria were removed by filtration or inhibited by various reagents and extracts proved sterile when obtained from cultures of amoebae with a single organism. When these extracts were allowed to act on gelatin solutions the change in viscosity was used as a measure of activity and gelatin disks impregnated with charcoal also served to indicate hydrolytic activity. Live amoebae or extracts were also allowed to act on 1·5% casein solution and the amount of hydrolysis occurring was determined as the tyrosine equivalent. Certain sera and culture media containing egg yolk inhibited proteolytic action and the degree of inhibition was measured since attention had been drawn by earlier workers to this phenomenon [*ibid*, 1959, v. 56, 613]. Proteolytic activity was quoted in relation to the number of amoebae of the different strains present. Virulence of these strains was determined by

their effect on the caeca of young rats [*ibid.*, 1947, v. 44, 313] after direct inoculation into that organ and compared with their proteolytic activity. The effect of *p*H, temperature, time of incubation and concentration of extracts as well as the effect of bacteria present on the rate of casein and gelatin hydrolysis was observed. At the same time search was made for other enzymes. It appeared that enzymes present did not require activation by –SH groups. Hyaluronidase, lecithinase or collagenase were not detected and surprisingly, since amoebae often ingest red cells, haemoglobin was not attacked *in vitro*.

The relationship between the types of culture used, invasiveness and proteolytic character, needs further investigation. Loss of high proteolytic character in amoebae appeared to be associated with loss of invasive character. The results of investigation on freshly isolated strains did not always accord with the clinical picture but 2 of 5 freshly isolated strains showed high proteolytic activity. It was of interest that bacteria accompanying amoebae showed no proteolytic activity. The author believes that high proteolytic activity is not required for tissue invasion. *J. D. Fulton*

Pizzi P., T. Identificación de *Entamoeba histolytica* en cortes histológicos. [**The Identification of** *Entamoeba histolytica* **in Histological Sections**] *Bol. Chileno de Parasit.* 1960, Jan.–Mar., v. 15, No. 1, 6–8. English summary (8 lines).

The author points out that, while the identification of *Entamoeba histolytica* in sections of intestine presents no difficulty, in other tissues—*e.g.* in the case of liver abscesses—elements of the reticulo-endothelial system, such as histiocytes and macrophages, can (and have been) mistaken for the amoebae.

A technique is described which provides not only a reliable method for the identification of *E. histolytica* in tissues, but also for a histopathological study of the lesions. For this purpose the author recommends a modification of Gallego's trichromic stain. The procedure is as follows: (a) after removal of paraffin wax and dehydration, sections are kept for 10 minutes in a freshly prepared solution consisting of 60 drops of Ziehl's fuchsin + 16 drops of acetic acid + 80 cc. of distilled water; (b) sections are washed in distilled water and placed for 3–5 minutes into a mixture of 40 drops of pure formol + 16 drops of acetic acid + 80 cc. distilled water; (c) after washing in distilled water, the sections are placed for 1 minute in a mixture containing 60 cc. saturated solution of picric acid + 30 cc. of 1% indigo carmine; finally (d) the preparations are rapidly washed in water, dehydrated in alcohols, cleared in xylol and mounted.

In preparations stained by this method, the cytoplasm of the amoebae is reddish-violet, while the nucleus is of a pale-green colour. On the other hand, in the histiocytes and macrophages the cytoplasm is pale-green, but the nucleus is reddish-violet. *C. A. Hoare*

Osburn, H. **Amoebiasis Cutis.** *Central African J. of Med.* 1960, Sept., v. 6, No. 9, 384–92, 10 figs. [14 refs.]

Published records of cutaneous amoebiasis in Africa south of the Zambesi are curiously scanty; indeed they are not very numerous in the world literature [but cutaneous amoebiasis is not by any means so infrequent, especially after

surgery, as might be inferred from this—for obvious reasons]. The author, after reference to the literature on the subject available to him, enlarges on the clinical features of the condition; he stresses the value of a specific rapid response to emetine treatment in establishing the diagnosis. He reports details of 2 African patients with cutaneous amoebiasis which he himself has encountered in Southern Rhodesia.

A male African 40–45 years old suffered abdominal pain for 2 months; after the second week a swelling developed near the umbilicus; this ulcerated and discharged matter like amoebic liver abscess material. The liver was not enlarged, nor apparently was it considered to be related to the lesion. Active *Entamoeba histolytica* were found in the discharge; 10 days' treatment with emetine injections was followed by healing of the ulcer. Subsequent radiography suggested a deformity of the transverse colon with adhesion to the anterior abdominal wall, but there was no evidence of sinus formation. On considering the possible origin of the parasites at this site in this case the author favours the view that they reached it by metastasis through the paraumbilical veins, which lie in the free border of the falciform ligament.

A 6-year-old African male child after an accident developed a swelling about the axillary line on the right side of the chest over the liver; this broke down and discharged and the neighbouring skin became involved. On vegetative *E. histolytica* being found in the discharge, treatment with emetine rapidly produced healing. The origin of the infection in this second case was considered to be an extension of an amoebic liver abscess. *A. R. D. Adams*

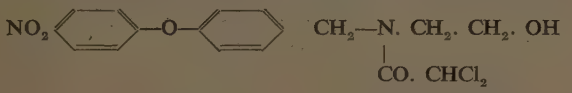
WAGNER, E. D. **Paromomycin in the Treatment of Amebiasis in Ethiopia.** *Antibiotic Med.* New York. 1960, Oct., v. 7, No. 10, 613–17.

96 patients (88 Ethiopians, 5 Americans and 3 Europeans) aged from 1 to 75 years, all with intestinal infections with *Entamoeba histolytica* and most of them with active clinical symptoms of the infection, were treated orally with Paromomycin. Stools were examined where possible on 3 successive days during the week after treatment, and similarly at monthly intervals subsequently. In practice from 1 to 10 stools were reexamined from 1 to 96 days after treatment, the average number of stools examined per patient being 4·6.

The details of dosage and its duration, and of results of stool examinations and their timing are set out in a table. The dosage levels in various series of patients were 30, 15 or 7·5 mgm./kgm. body weight daily for 2, 3 or 5 days. The drug was given in the form of capsules containing 150 or 250 mgm. of the base, or as a syrup, thrice daily by mouth after meals. About half the patients suffered some diarrhoea while taking the drug, but there were so side effects of consequence. It was concluded that 92 (95·8%) of the 96 patients were sterilized of their intestinal *E. histolytica* infections by Paromomycin treatment; 16 of these had been passing cysts only, but all the remainder (80) had suffered symptomatic infections with looseness of the bowel. Of the 4 patients whose infections were not eradicated [all of them suffering acute amoebic dysentery] 3 were re-treated successfully with this antibiotic. Another 4 patients became stool positive between 24 and 50 days after apparently successful treatment; these latter were considered to have become reinfected with the parasite and not to have been failures in treatment. *A. R. D. Adams*

De Carneri, I., Coppi, G., Almirante, L. & Logemann, W. **Amebicidal Drugs. I. Chlorophenoxamide: An Amebicide for Chemotherapy and Chemoprophylaxis.** *Antibiotics & Chemotherapy*. New York. 1960, Oct., v. 10, No. 10, 626–36, 5 figs. [20 refs.]

The authors have been concerned with the search for new amoebicides which do not contain toxic elements such as iodine or arsenic. They have already reported [this *Bulletin*, 1958, v. 55, 894], like a number of other authors, on the effectiveness of compounds containing a dichloracetamide group, and one of these substances, chlorophenoxamide (Mebinol), of the formula shown



proved active both *in vitro* and *in vivo*, including human infections.

It is a yellowish compound insoluble in water but soluble in certain organic liquids. It is practically non-toxic for mice, and thousands of human patients have been treated without ill effect [readers of this *Bulletin* will be familiar with clinical trials]. The compound does not possess any antibacterial activity. *In vitro* it appears that the new drug is more active than a number of established amoebicides including emetine, Chiniofon, etc. Attempts at preparing a strain resistant to the drug failed. It acted against certain amoebae of the genus *Entamoeba* but not against other genera of amoeba and was inactive in tests against a number of different protozoa or helminths. When tested in rats by the method of Jones [*ibid.*, 1947, v. 44, 313] it proved highly effective. There were relatively small amounts of the undecomposed drug in rat serum as determined colorimetrically and by paper chromatography. Urinary excretion after oral dosage was also measured and reached about 5% of the dose administered. Similar estimations were performed in man and showed that there was limited absorption from the intestine and the resultant level in faeces is high; about 8% of dosage is excreted in urine. "Clinical trials have confirmed that it is effective as a chemoprophylactic and chemotherapeutic for the various forms of intestinal amebiasis." [*Ibid.*, 1960, v. 57, 1172.] *J. D. Fulton*

Svanidze, D. P. [**Amoebiasis and Balantidiosis**] 206 pp., illustrated. [Numerous refs.] 1959. Moscow: Medgiz. [In Russian.]

In this book, which is intended for clinicians, epidemiologists and parasitologists, as well as for laboratory workers and medical students, an account is given of various aspects of human amoebiasis and balantidiosis.

In accordance with the relative importance of these two diseases, most of the book (9 chapters out of 10) is devoted to amoebiasis. In an introductory chapter a review is given of the history of this disease, while the successive chapters contain accounts of its aetiology, epidemiology, pathogenesis (including pathological changes and immunity), clinical aspects of the intestinal and metastatic infections, diagnosis (including differentiation of other intestinal protozoa), treatment and prophylaxis. The last chapter, devoted to balantidiosis, covers briefly the corresponding ground.

The description of the two diseases is competent and up to date, and there

can be no doubt that this book serves its purpose as a useful guide for Soviet medical readers. It is adequately illustrated and is accompanied by the essential references to Russian and foreign literature.

Some inaccuracies may be noted: (1) the concept of a commensal phase in *Entamoeba histolytica* is attributed to MATEVOSJAN in 1935, though in fact it had been enunciated as early as 1913 by KUENEN and SWELLENGREBEL [this *Bulletin*, 1914, v. 3, 76]; (2) the metacystic stage of this parasite is said to give rise to 4 amoebae [instead of 8]. *C. A. Hoare*

LUMBRERAS, H. Über ein neues, flüssiges Medium zur Kultur von Balantidien, Entamoeben und Trichomonaden. [**New fluid Culture Medium for Balantidia, Entamoebae and Trichomonads**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1959, Dec., v. 10, No. 4, 351–60. [Numerous refs.]

The author describes a new monophasic medium, in which the following intestinal protozoa were successfully isolated and cultivated: *Balantidium coli*, *Entamoeba histolytica*, *E. muris*, *E. chattoni*, *Trichomonas hominis*, *T. suis*, *T. muris*, and *Trichomonas* sp. from monkey. The medium consists of 0·12 gm. powdered horse serum in 100 cc. of Ringer solution containing 5–6% fresh egg albumin. It is put up in quantities of 3–5 cc. per test tube, with the addition of 0·6 mgm. rice starch. For work in rural areas, the author uses 2 cc. glass ampoules containing 0·765 NaCl, 0·0225 gm. KCl, 0·018 gm. $NaCO_3$, 0·027 gm. $CaCl_2$ and 0·12 gm. powdered horse serum. The contents of an ampoule are dissolved in 5–6 cc. fresh egg albumin, after which the volume is made up to 100 cc. with distilled water. Finally, the medium is dispensed in test tubes, to which rice starch is added, and these are incubated at 37°C. After inoculation of the material with protozoa, cultures are kept at the same temperature.

C. A. Hoare

DEKKHAN-KHODZHAEVA, N. A. [**On the Ability of *Giardia* to Penetrate the Tissues**] *Med. Parasit. & Parasitic Dis.* Moscow. 1960, v. 29, No. 2, 226–8. [In Russian.] English summary.

In sections of the alimentary tract of mice spontaneously infected with *Giardia* the author detected the presence of these flagellates within the walls of the duodenum and small intestine, where they occurred singly or in small groups. A number of clean mice were inoculated experimentally with faecal material from infected mice. The course of the infections was studied by daily examination of their droppings, in the majority of which *Giardia* cysts appeared 4–5 days after inoculation. Various organs of these animals were examined in sections for histopathological changes. The small intestine, especially the duodenum, was found to be thickened and hyperaemic, and there were signs of catarrhal, ulcerative and atrophic changes in the wall. Among the other organs there were isolated cases of liver abscess and manifestations of fatty dystrophy, serous glomerulonephritis in the kidneys and deposition of haemosiderin in the spleen.

On the basis of these findings, the author believes that under certain conditions *Giardia* in mice—and possibly also in man—is capable of invading the tissues and producing pathological changes in them. *C. A. Hoare*

RELAPSING FEVER AND OTHER SPIROCHAETOSES

Muñoz Cosin, F. Experiencias sobre la transmisión de la fiebre recurrente hispanoafricana en el laboratorio. [**Studies on the Transmission of Hispano-African Relapsing Fever in the Laboratory**] *Med. Trop.* Madrid. 1960, Jan., Feb. & Mar., v. 35, Nos. 1, 2 & 3, 50–59; 113–21; 173–85, 5 figs. [Numerous refs.]

This series of papers reviews the transmission of relapsing fever in Spain, Portugal and North Africa, and describes the morphology and gives an account of the biology of *Ornithodoros erraticus*, which has been used in the laboratory transmission of relapsing fever to guineapigs.

This information is best examined in the original papers. *B. R. Laurence*

YAWS AND OTHER TREPONEMATOSES

Rao, T. Encuestas por muestras estadísticas—su importancia en el programa de erradicación de la frambesia en Haití. [**Statistical Surveys—their Importance in Yaws Eradication Programme in Haiti**] *Bol. Oficina Sanitaria Panamericana.* 1960, Oct., v. 49, No. 4, 355–63, 3 figs.

The English summary appended to the paper is as follows:—

"The planning and execution of a sample survey based on statistical basis, to evaluate the eradication levels of yaws in Haiti, is described. The results achieved were discussed with the objects of the survey as background. The importance of sample surveys in evaluating the field operations and in planning future operations is discussed in detail.

"It can be concluded that a well conducted statistical sample survey in a yaws eradication program is sure to achieve its objects, and is found to reflect faithfully the eradication levels obtaining in the Country."

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Agricola, E. A lepra no Brasil. Resumo histórico. [**Historical Review of Leprosy in Brazil**] *Bol. Serviço Nac. de Lepra.* Rio de Janeiro. 1960, June, v. 19, No. 2, 143–55.

LEVADITI, J. C., DESTOMBES, P. & GRUMBACH, F. Comparaison des lésions macrophagiques et folliculaires de la lèpre et de la tuberculose. Éventualité d'une bactériostase intratissulaire. [**Comparison of the Lesions with Macrophages and Follicles in Leprosy with those in Tuberculosis. The Formation of a Bacteriostatic Agent in the Tissues**] *Bull. Soc. Path. Exot.* 1960, May–June, v. 53, No. 3, 430–35. [14 refs.]

The ingestion of tubercle bacilli by macrophages is not a phenomenon peculiar to this organism, but is common to many other acid-fast organisms during the first hours after their inoculation. In human tuberculosis, whether the lesions be exudative, follicular or caseous, the multiplication of the mycobacteria in the tissues is never on a scale comparable with that in lepromatous leprosy; they are few in number as in tuberculoid leprosy, are dispersed, and are extracellular. It is only in exceptional circumstances that tubercle bacilli multiply in the tissues to the degree found in leproma and become intracellular, as when H37Rv strain is injected in mice in certain conditions. The sparsity of bacilli in tuberculosis and tuberculoid leprosy is explained by the formation of a bacteriostatic action due to allergy, of which the follicular reaction is one of the visible results. This reaction is perhaps a general one, of which leishmaniasis furnishes another example. *Ernest Muir*

PERIASWAMY, W. **Differentiation of Tuberculoid Reaction, Borderline and Lepromatous Cases Bacteriologically.** *Leprosy in India.* 1959, Oct., v. 31, No. 4, 103–6.

The author describes 10 leprosy patients who were difficult to classify, on clinical grounds, as lepromatous, reacting tuberculoid or borderline. All the patients had extensive lesions with [apparently] limited borders, and their ear lobes were thickened. The author stresses the importance of taking in each case 3 slit smears, (A) from apparently normal skin, (B) from the periphery of the lesion, and (C) "A little farther (about 3 mm.) from the periphery of the lesions". Those with only B positive were reacting tuberculoid; those with B and C positive were borderline, and those with all three positive were lepromatous. These 3 types are likened respectively to a lake with cement banks, a lake with mud banks, and a river which can run freely in any direction without restriction. *Ernest Muir*

HASHIMOTO, M. & KOZUMA, A. **Bone Marrow of Autopsy Cases in Leprosy.** *Kyushu J. Med. Sci.* Fukuoka. 1960, Apr., v. 11, No. 2, 65–75, 17 figs. [23 refs.]

This paper records the results of histological and X-ray examination of the bones of 46 leprosy patients, material being obtained at autopsy. The bones examined were the femur, humerus, sternum, vertebral body, and iliac crest. The material was classified as 17 lepromatous, 29 neural [in one table these figures are reversed], and no tuberculoid. Histories of 3 patients are given in detail.

Haematopoietic activity was found to be weaker or more limited in most cases, as shown by examination of the marrow. Cells in leprous bone marrow had no

change characteristic of leprosy. Lymph nodules were found in the bone marrow in 9 of the 46 cases. Leproma was found in the bone marrow in 3 of the cases, all of severe lepromatous type of over 25 years' duration. These lepromata were found only in the ends of the long bones and in the sternum, placed up against the bone cortex. The lepromata were of a granulomatous nature, of the size of a millet to a rice grain, and composed of large foamy cells, large elliptical cells, and smaller numbers of plasma cells and lymphocytes with still smaller numbers of "eosinophils and Langhans' giant cells". Lepromas were surrounded by plasma cells and poorly marked off from the surrounding myeloid tissue. X-ray photographs showed atrophy of femur and humerus in several cases.

Ernest Muir

McLEAN, C. M. **Ocular Leprosy and Trachoma in a Leprosarium.** *Rev. Internat. du Trachome.* 1960, v. 37, No. 4, 635–9.

"The results are given of an Ophthalmic Survey of 172 patients in a Leprosarium in the Northern Territory, Australia. 135 of these were found to be suffering from ocular complications of leprosy, but these were mainly mild. 152 patients had evidence of trachoma, 109 being active. It is concluded that sulphone treatment helps to prevent the more serious ocular complications of leprosy, but has no effect on the course of trachoma."

LECHAT, M., with the collaboration of J. CHARDOME. Étude des mutilations lépreuses avec atlas de 85 radiographies et artériographies. [**A Study of Deformities caused by Leprosy, with an Atlas of 85 Radiographs and Arteriographs**] Preface by R. CHAUSSINAND. 276 pp., numerous illustrations. [221 refs.] 1960. Brussels: Editions Arscia S.A., 60, rue de l'Etuve. Paris VI^{e}: Masson et Cie, 120, Boulevard Saint-Germain.

The author writes from his experience in a leprosarium at Yonda (former Belgian Congo) over a period of 7 years. In the introduction he mentions that out of 1½ to 2 million leprosy victims with mutilations there are about 30 thousand in the Congo.

The book is divided into 4 chapters. Chapter I describes the radiological appearances of the hands and feet, illustrating them by radiographs and line drawings. The gradual successive resorption of the phalanges is traced. Out of 63 patients with resorption of phalanges of the hands there was resorption of metacarpals in only 7. The patient generally shows a variety of the following lesions: osteoporosis, periostitis, bay-like appearance, constriction, osteochondrosis, distal osteolysis, and fractures. The chief difference between lesions of the hands and feet is the greater involvement of the metatarsals as compared with the metacarpals.

Chapter II describes the evolution of mutilations in patients under sulphone treatment. This treatment appears to prevent osteolysis in parts not yet affected, and to diminish further extension where it has already begun. But osteoarthritic lesions of the metatarsals and phalanges of the foot may progress in spite of sulphone treatment.

Chapter III deals with the effect on mutilations of the type of leprosy, the

occurrence of lepra reaction, changes in sensation, thickened nerve trunks, and the association of ulcers.

Chapter IV is a contribution to knowledge of the pathogenesis of mutilations. It deals first with serum constituents: calcium, phosphorus, alkaline phosphatase, and proteins. It is found that in patients with mutilations the calcium and phosphorus concentration does not differ from that in healthy controls. The next two sections of this chapter are devoted to chronaxiemetry and thermometry, the latter dealing chiefly with the differences of rises in temperature between lesions and normal skin when heat is applied to the other side of the body. The last section of this chapter deals with arteriography in relation to vascular disturbances of the digits. By means of radiographs taken after the arteries have been injected, the effects of vasodilators on arteriovenous communication, terminal arteritis and arterial spasm are shown.

In summing up it is concluded that leprous mutilations may be divided into 4 groups: those caused by a bacillary process and which are commonly in the form of cysts; mechanical lesions such as metatarsophalangeal osteoarthritis following neuro-muscular changes; absorption related partly to changes in peripheral blood supply; lesions due to secondary infection.

[This book is well worthy of careful study. The arteriographs of the hands and feet are of special interest.] *Ernest Muir*

THANGARAJ, R. H. & THANGARAJ, Sarojini. **Phenylbutazone in the Treatment of some Reactive and Painful Complications of Leprosy.** *J. Indian Med. Ass.* 1960, Nov. 1, v. 35, No. 9, 395–7.

The author treated with phenylbutazone 52 leprosy patients suffering from one or more of the following reactive complications: acute arthritis, chronic arthritis, erythema nodosum, neuritis, burning sensation and thrombophlebitis. This drug was given either orally (800 mgm. a day in 4 divided doses for 3 days and then 400 mgm. for another day or two), or intramuscularly (600 mgm. daily for 3 days and then 300 mgm. for another day or two). There were side effects (oedema, jaundice) in only 4 patients, which cleared up in a few days. All but 7 patients showed improvement.

Oral use has been particularly useful in out-patients living at a distance, who are not able to attend frequently. *Ernest Muir*

MONTESTRUC, E. La réactivation par le B.C.G. des lèpres lépromateuses résiduelles, test de blanchiment et de suspension du traitement? [**Should Reactivation of Residual Lepromatous Leprosy by BCG be used as a Test of Cure and for Suspension of Treatment?**] *Bull. Soc. Path. Exot.* 1960, May–June, v. 53, No. 3, 398–401.

The author quotes his own experience and that of others of the occurrence of acute tuberculoid reaction called forth by inoculation with BCG in lepromatous type patients who had become apparently cured both bacteriologically and clinically.

The question is raised whether, as such severe reactions do sometimes occur, it is justifiable to inoculate patients of this type and stage with BCG. It is also

asked if it is not better rather to continue treatment indefinitely, or to assure complete cure by testing with some other form of reactivation.

The author after many experiences is opposed to the use of BCG in residual lepromatous patients. The effect of converting the Mitsuda reaction is doubtful. He reports the frequency of spontaneous conversion of the Mitsuda reaction in 295 lepromatous patients, in whom after periods of from 3 to 10 years 18 became doubtful, 17 became 1–plus, 3 became 2–plus and 1 became 3–plus, the rest remaining negative. It thus appears that the Mitsuda reaction remains negative in the great majority of cured lepromatous patients, and it is not considered justifiable to attempt conversion by means of BCG in such cases, and thereby run the risk of producing severe reaction. *Ernest Muir*

CHANG, Y. T. **Changes in the Length of** *Mycobacterium leprae murium* **in the Evolution of Murine Leprosy in Mice.** *Amer. Rev. Respiratory Dis.* 1960, Sept., v. 82, No. 3, 409–11, 2 figs.

In the recent reports on limited multiplication of *Mycobacterium leprae-murium* in tissue cultures no notice seems to have been taken of the length of the bacilli, and as the bacilli were obtained from animals soon after infection, the increase may have been caused by the long bacillary forms, present at this stage of the infection, dividing into shorter forms. The author has therefore re-examined the sizes of the bacilli in the mesentery, spleen and liver.

The mice were injected intraperitoneally and the methods used were those previously described [this *Bulletin*, 1959, v. 56, 1148]. Elongation of the bacilli was apparent by the fourth day, reaching a maximum increase of at least 2·6 times in the mesentery and omentum and 1·8 times in the liver and spleen by the eleventh day. The bacilli then showed little change for 6–9 weeks, after which they began to diminish in average length so that by the 110th day they were of minimal size.

Therefore, unless changes in bacillary length are taken into account, an increase of 2- to 3-fold in numbers during incubation in tissue cultures will not necessarily indicate successful cultivation. *S. R. M. Bushby*

HELMINTHIASIS

*In this section abstracts are arranged as far as possible in the following order:—*TREMATODES *(schistosomes, other flukes);* CESTODES *(Diphyllobothrium, Taenia, Echinococcus, other cestodes);* NEMATODES *(hookworms, Ascaris, filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.).*

COUMBARAS, A. La bilharziose dans le sud tunisien. Étude particulière du Nefzaoua (Région de Kébili-Douz). **[Schistosomiasis in the Kébili-Douz Region, Southern Tunisia]** *Arch. Inst. Pasteur de Tunis.* 1960, Sept., v. 37, No. 3, 313–33, 1 map & 17 figs. on 9 pls.

The only vector snail species found in South Tunisia, which borders on the true desert, is *Bulinus truncatus*. Its natural breeding grounds are the artesian

springs of oases, but its distribution has been increased greatly by the spread of irrigation agriculture, especially since constant flow systems have replaced those of intermittent flow. Through bathing, agricultural work, clothes washing and drinking water, some 60% of the region's child population have become infected.

Treatment normally is reserved for those with serious symptoms, except in a few villages at which snail eradication has been carried out. The artesian sources are dealt with by enclosure with concrete caps, the water being piped away in underground conduits or overhead pipes to the irrigation areas. If a basin is made at a point where an open culvert changes direction sharply, here snails accumulate and here, also, human beings bathe. Such places must be guarded from bathers, or, better, eliminated by substitution of curving concrete culverts. Molluscicides by themselves kill only a proportion of any snail population, and must be taken as adjuvants of biological methods of control, preventing the snail from breeding, and breaking its contact with the human being. [This paper is well illustrated with photographs.] *B. B. Waddy*

De Morais, T. A bilharziose em Moçambique. [**Schistosomiasis in Mozambique**] *Anais Inst. Med. Trop.* Lisbon. 1959, Jan.–Dec., v. 16, Nos. 1/4, 179–86. English summary.

A survey of the incidence of schistosomiasis in Mozambique has shown that *Schistosoma haematobium* has an almost universal distribution and an incidence of 66·17% in the age-group 3–24 years. *S. mansoni* is also widely distributed but is much less common and in the same age-group has an incidence of only 9·33%.

Both parasites were studied in 421 localities in the 9 districts of the province. The urinary infection was found in all places but the intestinal form had only a localized distribution and was found to be completely absent in the district of Cape Delgado. *Bulinus globosus, B. africanus* and *Biomphalaria pfeifferi* were all found infected with schistosome larvae in nature and *Bulinus forskali* was found to be susceptible to experimental infection but was never found infected in nature. It is estimated that 4·6% of the patients in hospitals and at outpatients clinics report for treatment of schistosomiasis and post-mortem findings suggest that many cases of carcinoma of the liver may have a schistosomal origin.

The author considers that a general campaign for the control of schistosomiasis in the territory is not yet practicable and preliminary pilot schemes must first be undertaken. *C. A. Wright*

De Morais, T. Subsídios para o estudo dos moluscos hospedeiros intermediários da bilharziose nos distritos de Moçambique, Niassa e Cabo Delgado (Província de Moçambique). [**Survey of Snail Intermediate Hosts of Schistosomiasis in the Mozambique, Nyassa and Cape Delgado Districts of Mozambique**] *Anais Inst. Med. Trop.* Lisbon. 1960, Jan.–Dec., v. 16, Nos. 1/4, 187–98. English summary.

A survey of the fresh water snails in three districts (Mozambique, Nyassa and Cape Delgado) of the province of Mozambique was carried out between the months of July and October 1956. Particular attention was given to water

bodies which serve as washing points or children's bathing places. 167 habitats were examined and collections were made with a net. Potential intermediate hosts of human schistosomiasis were found in 47·3% of the habitats, *Bulinus globosus* in 32·93%, *B. africanus* in 19·16% and *Biomphalaria pfeifferi* in 1·79%. None of the *B. pfeifferi* were found to be infected with schistosome cercariae but in 14 localities the bulinids were shedding furcocercariae and the mean infection rate in these places was 35·47%.

Other species of snail found were *Bulinus forskali, Lymnaea natalensis, Gyraulus costulatus, Lentorbis junodi, Cleopatra africana, C. amoena, Pila ovata, Melanoides tuberculata, Lanistes ovum, L. purpureum.* *C. A. Wright*

WRIGHT, C. A. **Host-Location by Trematode Miracidia.** *Ann. Trop. Med. & Parasit.* 1959, Sept., v. 53, No. 3, 288–92. [19 refs.]

The main point discussed in this interesting paper is "whether there is any specific mechanism of host-finding by a free-swimming miracidium, or whether this stage of the trematode life-cycle depends upon random movements and chance contacts". Dr. Wright's review of the literature, including his own observation that species-specific substances have been demonstrated in the body-surface mucus of a number of species of fresh water snails (*J. Linn. Soc.* (*Zool.*) 1959, v. 44, 222), produces considerable evidence in favour of a chemotactic mechanism. "In the forms in which the life-cycle includes a free-swimming miracidium, there is a pattern of behaviour by the larvae, in response to various stimuli, which results in the necessary contact. The first phase of this pattern is the location of the host-environment by reaction to a physical stimulus; in the case of some *Schistosoma* species there is a positive phototropism, which brings the larvae into the surface layers of the water, where the snail populations are most concentrated. When the host-environment is reached, a period of random movement follows, which continues either until the death of the larva or until it comes within the orbit of chemical attraction of a host snail. Once under the influence of this chemical stimulus, the movements of the miracidium do not become definitely directional; the larva continues to move in an apparently random manner, but it will tend to be held within the orbit of the chemical stimulus. Entry of the host does not necessarily occur on first contact, and further work is needed to analyse the character of the releaser mechanism which stimulates penetration."

[This paper is essentially a survey of the literature and appears to contain no original observations, but in addition to summarizing modern views it has many original suggestions for future investigations.] *R. M. Gordon*

MANDAHL-BARTH, G. **Intermediate Hosts of *Schistosoma* in Africa: Some Recent Information.** *Bull. World Health Organization.* Geneva. 1960, v. 22, No. 5, 565–73, 2 figs. & 2 pls.

This paper is a supplementary contribution to the author's monograph published in 1958 [this *Bulletin*, 1958, v. 55, 664]. In it are described two new sub-species, some amendments to the earlier work are made and a number of new locality records are reported. The new sub-species are *Biomphalaria sudanica*

rugosa, distinguished by the relatively much longer penis sheath and collected near Kapalala in Northern Rhodesia, and *Bulinus* (*Physopsis*) *nasutus productus* which differs from the nominate sub-species in its longer and more slender shell and by the relatively greater height of the spire. This last form appears to replace the nominate sub-species in inland areas in east Africa. The form described as *Bulinus tropicus mutandaensis* in the monograph has now been re-named *B. t. toroensis* and *mutandaensis* is now considered to be a distinct species. *Bulinus sericinus* is reduced to a sub-species of *B. truncatus*. All of the sub-species of *Biomphalaria pfeifferi* described in the monograph are no longer thought to be valid with the exception of *B. p. rhodesiensis* which is so distinct that it may be a separate species. *C. A. Wright*

WRIGHT, C. A. **The Crowding Phenomenon in Laboratory Colonies of Freshwater Snails.** *Ann. Trop. Med. & Parasit.* 1960, June, v. 54, No. 2, 224–32, 5 graphs. [14 refs.]

The experiments, which extended over 3 years, were carried out with colonies of *Bulinus forskali*. During this period the effects of overcrowding were studied by means of a series of ingenious techniques, which involved estimations of the growth rate, from birth onwards, and the fecundity of snails exposed to actual crowding by other snails of the same species, or (in another series of experiments) to the waste products of snails of the same species.

The results of these experiments show " that the dwarfing and reduction in reproductive potential caused by overcrowding of laboratory colonies of freshwater snails are caused by the excretory products of the snails ". Although it is proved that the excretory products of the snails, when in sufficient concentration, have a deleterious effect it is not known whether this is due to a general poisoning or is brought about by a specific substance of a hormone nature. The term " pheromone " has been suggested as a name for a substance which is secreted by an animal to the surrounding environment and which causes a specific reaction on its reception by an animal of the same species.

" In conclusion, the potential practical value of these observations should be considered. To the laboratory worker interested in the maintenance of colonies of snails for trematode life-cycle studies the implications are obvious, to the taxonomist the uselessness of absolute size as a criterion of value in gastropod species determinations is confirmed. If, as has been suggested, the pheromones responsible for reduction in fecundity and susceptibility to trematode infection are unstable compounds, they are likely to be difficult to isolate, but if they could be examined chemically they might provide information of considerable value in the development of new molluscicides with more specific activity than those at present in use."

[See also this *Bulletin*, 1957, v. 54, 973, 1204 *bis*.] *R. M. Gordon*

NAJARIAN, H. H. **The Relation of Water Volume to Egg Production in the Snail** *Bulinus truncatus*. *Texas Reports on Biol. & Med.* 1960, v. 18, No. 3, 470–72.

Using *Bulinus truncatus* from Baghdad as experimental subjects the author has investigated the relationship between egg production and water volume in

freshwater snails. The sets of experiments were carried out with water volumes of 30, 100 and 150 ml. per snail and in each set two size groups of snail were used, 6·5–8·4 mm. and 8·5–10·0 mm. shell length. The individuals kept in 30 ml. were isolated while those in the larger water volumes were in groups of 10–31 snails per container. Under these conditions no significant correlation between egg production and water volume per snail was observed. *C. A. Wright*

PRINGLE, G. **Invasion of the Egg Masses of the Mollusc *Bulinus* (*Physopsis*) *globosus*, by Larval Chironomids.** *Parasitology*. 1960, Nov., v. 50, Nos. 3/4, 497–9.

"1. It has been observed that the larvae of four species of chironomid midges invade and destroy the contents of the egg masses of *Bulinus* (*Physopsis*) *globosus* in Amani Lake, Tanganyika.

"2. There was no indication that this type of predation exercised any restraint on the density of adult snails."

FRIPP, P. J. **Schistosomiasis and Urinary β-Glucuronidase Activity.** [Correspondence.] *Nature*. 1960, Nov. 5, v. 188, 507–8.

It has been suggested that a carcinogen may be liberated by β-glucuronidase in the urine from inactive glucuronides, since the enzyme is increased in the urine of patients with carcinoma of the bladder. The role of schistosomiasis in the aetiology of cancer of the bladder is controversial [this *Bulletin*, 1960, v. 57, 820]; the author therefore measured the β-glucuronidase in 24-hour samples of urine from 18 normal Africans, 7 patients with urinary schistosomiasis (*S. haematobium*), and 8 patients with intestinal (*S. mansoni*) schistosomiasis. The normal subjects excreted an average of 1,475 units of the enzyme in 24 hours (comparably with Europeans, 1,405 units), the *S. mansoni* carriers 1,970 units, and the *S. haematobium* carriers 4,560 units. After treatment with lucanthone hydrochloride [Nilodin] or sodium antimonyl tartrate the enzyme activity fell rapidly, especially in the *S. haematobium* carriers.

The haematuria associated with the disease was not likely to have caused an increase in enzyme activity, since the latter was not observed in 2 persons with sterile haematuria not due to schistosomiasis. [It would be reassuring to know that urinary infection, so common in schistosomiasis of the bladder, had not contributed to the raised enzyme levels by bacterial synthesis.]

Alan B. Raper

FAYEZ, M. & RAGHEB, M. **Effect of Hematemesis on the Liver Function Tests in Schistosomiasis of the Liver.** *J. Egyptian Med. Ass.* 1960, v. 43, No. 6, 424–30. [15 refs.]

The appearance of haematemesis during the progress of cirrhosis of the liver heralds the onset of liver failure, with cholaemia, jaundice or ascites. Egyptian patients with schistosomiasis often suffer from haematemesis and this it has been found is soon followed by liver failure. The ascites which may succeed is

a result of increased portal pressure; it is not due to liver failure as in these Egyptian patients it is not directly related to the degree of departure from normal of liver function tests.

Liver function tests, in conjunction with other investigations, were done on 250 Egyptian patients showing evidence of schistosomal involvement of the liver. Some 20 of these 250 subsequently suffered from haematemesis and were again investigated in a similar manner; 7 of the 20 died within so short a time that the tests could not be completed. Though 25% of those who suffered haematemesis had shown normal liver function on first examination every one of them showed marked liver derangement after the bleeding, as judged by these tests.

A. R. D. Adams

MARILL, F. G. Essai de détection de la bilharziose à *Schistosoma haematobium* par intradermoréaction, au cours d'une enquête épidémiologique en Haute-Volta. [**Diagnosis of Schistosomiasis due to** *Schistosoma haematobium* **by Intradermal Reaction, during an Epidemiological Survey in Upper Volta**] *Bull. Soc. Path. Exot.* 1960, May–June, v. 53, No. 3, 416–20.

During an investigation of a focus of infection with *Schistosoma haematobium* at Houndé in Upper Volta, a comparison was made of the findings by skin test and by urine examination in the same group of subjects. The antigen employed was supplied by Dr. W. ALVES of S. Rhodesia. The group contained 463 subjects, mostly children and adolescents. The injection of antigen was made intradermally to produce a papule 3 mm. in diameter, and readings were made after 12, 15 and 18 minutes.

Among 200 subjects passing eggs in the urine, 45% gave a negative or doubtful skin reaction, while 55% gave positive reactions of varying intensity. On the other hand among 248 persons free from eggs and haematuria at a single examination, 70·5% were negative or doubtful and 29·3% were positive; these positive reactors could well be infected, even though ova had not been discovered at a single examination of the urine. It is concluded that the skin test fails to diagnose many cases of infection. The short interval between injection and examination of result is inconvenient to the lone investigator.

F. Hawking

EL-BADRI, A. & AZIZ, S. **Effect of Abdominal Paracentesis on the Electrolytic Pattern in Bilharzial Cirrhosis with Ascites.** *J. Egyptian Med. Ass.* 1960, v. 43, No. 9, 579–95, 1 fig. [30 refs.]

"1. The effect of abdominal paracentesis on the plasma, ascitic fluid and urine electrolytes in 22 patients is reported.

"2. Increased aldosterone activity following abdominal paracentesis occurred in 20 patients (90.90%) as evidenced by a decrease in urinary excretion of sodium, an increase in the potassium excretion and a decrease in the Na/K ratio in the urine. These changes occurred on the first day after tapping and persisted till the end of the observation period in the seventh day. The plasma sodium showed an increase while the plasma potassium was decreased in most cases so that the Na/K ratio in the plasma was increased after abdominal tapping.

"3. In 2 cases (9.09%), no change in the urinary excretion of sodium or

potassium was found and the Na/K ratio in the urine was not altered or even showed an increase when compared with the control values. This denotes absence of increased aldosterone activity in these 2 patients."

NEWSOME, J. & ROBINSON, D. L. H. **The Estimation of Lucanthone in Plasma and Serum.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1960, Sept., v. 54, No. 5, 454–8.

Lucanthone (Miracil D, 1 diethylamino-ethylamino-4-methyl-thioxanthone) has a carcinostatic effect on mouse tumours *in vitro* and derivatives of this compound continue to appear for the treatment of schistosomiasis. The present paper gives details of a technique for the measurement of lucanthone in the blood. It differs from that described by LATNER *et al.* [this *Bulletin*, 1948, v. 45, 96] in that extraction of the dye is carried out with chloroform: this was found to yield even more accurate results if the plasma proteins were first precipitated. Another technique involves precipitation of the plasma proteins with acetone and, after their removal, addition of caustic soda and extraction of the dye with ether. The lucanthone is transferred into hydrochloric acid and measured in an absorptiometer. The second method is the more accurate and can be used for amounts of 2·5 ml. plasma or less. *H. Lehmann*

PITCHFORD, R. J., MEYLING, A. H., BRUMMER, J. J., DU TOIT, J. F. & VORSTER, S. V. **An Assessment of Copper Sulphate as a Molluscicide in the Eastern Transvaal Lowveld.** *Central African J. of Med.* 1960, Mar., v. 6, No. 3, 97–108.

This valuable paper describes carefully controlled field experiments with copper sulphate as a molluscicide. Copper sulphate is cheap, safe, easy and not unpleasant to handle. It is precipitated as copper carbonate in an alkaline medium. Experimentally, a solution of 6 parts per million copper sulphate was brought to *p*H 7 by addition of sodium carbonate, after which 0·9 parts per million of copper remained in solution. As little as 0·05 gm. of kaolin in 200 ml. of distilled water at *p*H 7 absorbed two-thirds of the copper in a similar solution.

If reinfestation from outside sources is prevented, and specifically if vegetation has been cleared from the water, copper sulphate at an estimated final dilution of 20 p.p.m., sprayed all over the water surface, is capable of wiping out the population of *Physopsis* spp., but appears to have no lasting effect on *Biomphalaria* spp. even after frequent repetition. In one field experiment, the dams and canals of a large irrigation system were treated every 6 weeks with 20 p.p.m. copper sulphate, while being kept free of vegetation. The water *p*H was 7 to 8. There was a tremendous reduction in the snail population, *Physopsis* being much more affected than *Biomphalaria*. The recurrent expense was over £100 per mile, and after 4 years' control work a survey showed little if any reduction in *Schistosoma haematobium* and *S. mansoni* rates in children between 1 and 9 years old. The results of 8 field experiments are discussed in the text and tabulated.

The conclusion, after 5 years of experiments, is that copper sulphate has little to commend it as a molluscicide. *B. B. Waddy*

CAPRON, A. & BRYGOO, E. R. Contribution à la connaissance de la bilharziose intestinale à *Schistosoma mansoni* à Madagascar. Étude du foyer d'Ambositra. I. Enquête malacologique et parasitologique. **[Observations on *Schistosoma mansoni* Infections in Madagascar. Malacological and Parasitological Study in the Ambositra Focus]** *Bull. Soc. Path. Exot.* 1959, July–Aug., v. 52, No. 4, 503–15, 1 map. [11 refs.]

The focus of *Schistosoma mansoni* at Ambositra in Madagascar has been known since 1928 and recent investigations of the incidence of the parasite in the area have led the authors of this paper to study more closely the transmission of the disease. A total of 42 fresh water habitats were examined and in 35 of these which contained snails *Biomphalaria madagascariensis,* the proved intermediate host of *S. mansoni,* was found in 22. The snails from these localities were examined for infection by dissection and from a total of 500 specimens only 4 were found to be infected with the larval stages of the human parasite. These 4 specimens came from habitats in the same irrigation ditch. The identity of the cercariae was proved by the successful infection of mice, with subsequent recovery of adult worms of each sex. The paper includes details of the other cercariae found in *B. madagascariensis* of which the most notable were a species of *Paramphistomum* (4·2%), and the metacercariae of echinostomes (49·6%). The larval trematodes found in *Bulinus liratus* are also listed.

C. A. Wright

ROBINSON, D. L. H. **Egg-Laying by *Schistosoma mansoni in vitro*.** *Ann. Trop. Med. & Parasit.* 1960, Apr., v. 54, No. 1, 112–17, 2 pls.

In an earlier paper [this *Bulletin*, 1956, v. 53, 1013] the author described a technique for maintaining alive *in vitro*, and under sterile conditions, the adults of *Schistosoma mansoni* which had previously been removed from a rodent host. In these experiments the worms remained alive up to two months, during which time the females produced many eggs.

The present paper is an extension of the work previously recorded, with particular emphasis on the conditions governing egg laying. The results may be summarized as follows. 1. The worms appear to lay eggs only when they are *in copulo*. 2. It is suggested that the stimulus required by the female to lay eggs may be a tactile one received from the male. 3. Although some, at any rate, of the eggs appear to be fertile, all attempts to mature them failed. 4. When the flukes are maintained *in vitro*, egg laying is at its best when the worms are immersed in serum from poor hosts, such as the guineapig and the rat, and it is at its worst when the serum surrounding the worms has been obtained from good hosts such as man and cotton-rat.

The process of egg laying is well illustrated by stills taken from a cine film.

R. M. Gordon

BÉNEX, Jacqueline. Conservation en survie des oeufs de *S. mansoni*. **[Preservation of Live Eggs of *S. mansoni*]** *Bull. Soc. Path. Exot.* 1960, May–June, v. 53, No. 3, 526–31.

As is shown during a review, the survival of schistosome eggs varies according to the species and the conditions. Attempts to preserve them in tissues or

faeces are handicapped by growth of bacteria. Penicillin 500 U./ml. does not harm the miracidium but does not prevent bacteria from growing. Streptomycin 1 mgm./ml. or merthiolate [thiomersal] 0·1 mgm./ml. kills the miracidium. A solution of sulphanilamide has been successful in a concentration of 0·3 mgm./ml. Fragments of organs containing ova, or of faeces, were suspended in 1% sodium chloride. At −25°C. the ova died at once, at 0°C. they survived 24 hours, at 4°C. they survived 6–10 days, and at 10°C., 2–3 days. At all temperatures except −25°C. growth of bacteria was troublesome. Further experiments were made with ova separated from the tissues by enzymatic digestion [see BÉNEX, p. 337, below]. In 1–1·4% NaCl+sulphanilamide such ova survived as follows: −25°C., immediate death; 0°C., 5–6 days; +4°C., 30–35 days; 12°C., 6 days; 25°C., 3 days. In 7% glucose (isotonic) survival was slightly shorter; with 7% Subtosan (a polyvidone), the survival was equal to that in NaCl. In 10% glycerol (plus NaCl or glucose) the ova died almost at once; apparently the miracidium and the egg shell are both sensitive to glycerol.

It is concluded that ova of *S. mansoni* are more delicate than those of *S. haematobium*. Ova are best isolated from the tissues or faeces and preserved in the dark at +4°C. The best solutions to use are 1% NaCl and 7% Subtosan.

F. Hawking

CAPRON, A. & BRYGOO, E. R. Mise en évidence de la formation de la substance acido-alcolo-résistante de la coque de l'oeuf de *Schistosoma mansoni*. **[Demonstration of the Formation of an Acid-Alcohol-Resistant Substance in the Shell of *Schistosoma mansoni* Eggs]** *Arch. Inst. Pasteur de Madagascar*. 1960, v. 28, 153–4.

The authors have already shown that the acid-alcohol-resistant substance [AAR] in the eggs of various trematodes was formed as granules secreted by the vitelline glands [this *Bulletin*, 1960, v. 57, 717]. They have now examined female *S. mansoni* in various stages of maturity obtained from the mesenteric and hepatic veins of mice infected experimentally. In sagittal section of mature worms stained by the Ziehl-Neelsen method, intensely staining red granules were found in the eggs *in utero* and in the vitelline secretion within the glands or between the cells. The vitelline cells themselves were not stained by this method, nor was any AAR substance found in the gland of Mehlis. As in the case of the other trematodes, the density of the AAR granules and the depth of colour seemed to vary with the degree of maturity.

H. J. O'D. Burke-Gaffney

MICHELSON, E. H. **Chemoreception in the Snail** *Australorbis glabratus*. *Amer. J. Trop. Med. & Hyg.* 1960, Sept., v. 9, No. 5, 480–87, 3 figs. [20 refs.]

Experiments by means of a Y-shaped maze have been carried out to investigate the attractiveness of various substances to the snail *Australorbis glabratus*. In addition observations have been made on the mechanism of chemoreception in this species. In the first series of tests 8 baits were used: filter paper, human faeces, human urine, lettuce, watercress, ground watercress, chlorophyll extract of watercress and snail food based on alginate. Of these only the alginate food

proved to be definitely attractive and the ground watercress was definitely repellent.

The 5 ingredients of the alginate food were then tested separately and it was found that the only attractive item was wheat germ.

A further series of tests, with alginate food as bait, were carried out; some of the tests were made with snails in which the osphradium had been previously cauterized, others were performed with operated controls in which some other part of the head region or foot had been cauterized and a third series of normal controls were also used. The behaviour of snails with the osphradium cauterized was random with respect to the selection of the baited chamber while the other two sets showed a strong response to the alginate food. *C. A. Wright*

PELLEGRINO, J. & MEMORIA, J. M. P. A reação intradérmica na esquistossomose mansoni. II. Observações sôbre a estabilidade de antígenos de cercária e verme adulto. [**The Intradermal Test in *Schistosoma mansoni*. II. Observations on the Stability of Cercarial and Adult Worm Antigens**] *Rev. Inst. Med. Trop. São Paulo.* 1960, July–Aug., v. 2, No. 4, 213–17, 2 figs. [12 refs.] English summary. III. Influência da idade, sexo, côr e local de reação. [**III. Influence of Age, Sex and Colour of the Patients and Site of the Test on the Results**] *Ibid.*, 218–23, 1 fig. [11 refs.] English summary.

II. Continuing their work on the use of intradermal tests in *Schistosoma mansoni* infections [this *Bulletin*, 1961, v. 58, 79] the authors from the Research Centre at Belo Horizonte, Minas Gerais, Brazil, report in the first of these two papers the results of intradermal tests with antigens made both from cercariae and adult worms of *S. mansoni*. The antigens were subjected to various kinds of treatment to determine their keeping qualities as follows: (a) used fresh; (b) kept in the refrigerator (4–10°C.) for periods varying from 4 months to 2½ years; (c) dried *in vacuo* and placed in sealed ampoules kept at ambient temperature for 12 months. In addition, tests with both cercarial and adult worm antigens were performed on patients who had been tested 2½ years previously with the same antigens.

6 groups of patients, totalling 122 persons, all males aged from 10 years upwards who had *S. mansoni* ova in the faeces, were tested for the most part with antigens diluted 1 in 10^3, though in 2 groups tests were also made with dilutions of 1 in 10^4 and 1 in 10^5; 0·05 ml. of the antigen was injected into the skin of the forearm and the result read 15 minutes later. All the patients showed positive intradermal tests and there was really little variation in the size of the wheals in the various groups [though from table 1 the average size of the wheals with cercarial antigen was usually larger than with adult worm antigen]. Even desiccated adult worm antigen kept in an ampoule for 12 months at ambient temperature still gave a satisfactory result, thus enabling an antigen to be kept in the laboratory and used when required.

The authors conclude, therefore, that antigens prepared in the way they have already described can remain stable for at least 2½ years.

III. To ascertain whether age, sex, colour, or site of the intradermal test had any effect on the result against either cercarial or adult worm antigens, tests were performed on 5 groups of patients as follows:—

A. 250 males; 100 aged 10–15 years, 50 aged 16–19 years, 100 aged 20 and upwards;

B. 50 males and 50 females aged 20 years and upwards;

C. 150 males aged 20–50 years, 50 white, 50 brown, 50 Negro;

D. 89 children 10–15 years old, 31 white, 32 brown, 26 Negro;

E. 20 children 10–12 years old, in whom injections were given I-D into the forearm, over the deltoid, and in the interscapular region.

The antigens were usually used in 1 in 10^3 dilution but in group A they were tested up to 1 in 10^7. Here the 90% positive rate was not reached till 1 in 10^3 was used. Wheals with areas of 1·2 sq. cm. were taken as positive.

The results were as follows: (1) adults showed a greater average size of wheal and a greater percentage of positive results than children, and adult males more than women; (2) Negroes had larger wheals than either whites or those with brown skins, though there was no difference between the last two; (3) children had a higher percentage of positive results and larger wheals in the interscapular region.

The authors conclude consequently that age, sex, colour and site of injection have a decisive influence on the results obtained and they suggest that in women and children the test should be performed on the back rather than on the forearm; this is not necessary for men, however. *W. K. Dunscombe*

Bénex, Jacqueline. Méthode pratique de récolte d'oeufs de schistosomes par digestion enzymatique. **[Practical Method of Recovering Schistosome Eggs by Enzymatic Digestion]** *Bull. Soc. Path. Exot.* 1960, Mar.–Apr., v. 53, No. 2, 309–14.

In order to recover alive the eggs of *Schistosoma mansoni* from the tissues of infected animals the author tried various digestive fluids. Pepsin was found to be unsatisfactory because it was too acid and killed the miracidia within the eggs. Papain gave good results so far as release of the eggs from the tissues was concerned but a proportion of the eggs thus released were distorted. Trypsin when employed in the manner recommended by the author gave excellent results and yielded a large number of viable eggs free from organic debris. The problem now remaining, and one which the author intends to investigate further, is how to store the material thus obtained in such a way that it will afford a stock of living eggs which can be used when required. [The original should be consulted for details concerning the technique to be employed when trypsin is used as a digestive agent for the recovery of schistosome eggs.]

R. M. Gordon

Stretch, R. G. A., Stretch, S. J. E., Leytham, G. W. H. & Kershaw, W. E. **The Effect of Schistosomiasis upon Discrimination Learning and Activity in Mice. I. An Acute Infection.** *Ann. Trop. Med. & Parasit.* 1960, Oct., v. 54, No. 3, 376–80, 2 figs.

28 mice were assigned at random to two groups, an infected group of 15 animals and a control of 13. The mice " were placed in a tank filled with water to a depth of 4 inches, from which they could escape by swimming a minimum distance of 20 inches to one of two adjacent doors through which they gained access to a ramp above water-level. On each trial, only one of the two doors

was unlocked, and the unlocked door was varied at random from trial to trial. The mice were required to learn that the door bearing a black rectangular card was always unlocked, irrespective of its position, while a white rectangular card always appeared on the face of the locked door". The results of this study, which are depicted graphically, confirmed the authors' previous contention [this *Bulletin*, 1960, v. 57, 822] that acute infection with *Schistosoma mansoni* retards learning ability in laboratory rats, but the authors point out that whereas in their first paper this conclusion was based on the results of experiments in which rodents learnt to negotiate a maze in order to secure food, the conclusions in the present paper are based on the results of experiments in which the activating motive was fear and the animals, in order to escape from fear, had to learn perceptual distinction between two differently coloured objects. They consider that this difference is significant since it demonstrates that the retardation in learning caused by schistosomiasis cannot be explained solely in terms of any aberration in food-seeking behaviour.

It would appear that some, at any rate, of the behavioural characteristics described in these experiments might be due to a reduction of activity in the infected rodents, so that in the maze experiment the less active rats found the food more slowly than did the normal rats, while in the swimming test their chance of reaching and opening the unlocked door would be lessened. To test this, the distance covered by infected and uninfected mice, during similar periods of time, was estimated and it was found that "schistosomiasis reduces activity as assessed by the swimming-test". [Is it not possible, even if unlikely, that a reduction of activity in the infected rodents might account not only for some but for all the behavioural characteristics described in both papers?]

R. M. Gordon

ROBINSON, E. J., JR. **Survival and Developmental Aberrations in *Schistosoma mansoni* following the Administration of Stilboestrol to the Hosts.** *J. Helminthology*. 1960, v. 34, Nos. 1/2, 81–4.

10 mice were exposed to cercariae, and treated intramuscularly with 0·05 mgm. of stilboestrol at 3-day intervals for 46 days (16 injections). 6 died from toxic effects. 4 were killed after 47 days and compared with 10 control untreated mice. The 4 experimental mice contained $13{\cdot}6 \pm 2{\cdot}2$ male and $19{\cdot}7 \pm 4{\cdot}0$ female worms per mouse; the 10 control mice contained $25 \pm 2{\cdot}2$ male and $29{\cdot}6 \pm 2{\cdot}5$ female worms per mouse. In the treated mice most of the worms were in the liver, and in the control mice they were in the mesenteric and portal veins. Sexual maturity of the worms was delayed in both sexes and many of the male worms had accessory gonadal tissue, which was probably ovarian. The male worms were shorter (by a third) than those in the control mice.

[See also this *Bulletin*, 1959, v. 56, 1157.] *F. Hawking*

BRENER, Z. **Chemotherapy of Experimental Schistosomiasis. III. Comparative Drug Activity of Some Antimonial Compounds in Mice experimentally infected with *Schistosoma mansoni*.** *Rev. Inst. Med. Trop. São Paulo*. 1960, July–Aug., v. 2, No. 4, 224–9, 1 fig. [10 refs.]

Mice were infected with *Schistosoma mansoni* by the usual methods [STANDEN, this *Bulletin*, 1950, v. 47, 552; 1953, v. 50, 732]. After 35 days they were treated

with drugs by intraperitoneal injection daily for 5 days and they were killed for examination 7 days after the last dose. The CD50 was the dose which clears 50% of the mice from worms, and the RD90 the dose which kills 90% of the worms. These figures were compared with the LD50—the intraperitoneal dose which killed 50% of the mice. Expressed as antimony mgm./kgm. the results for LD50 and RD90 are shown below:

	LD50	RD90	LD50/RD90
Fouadin	151	47	3·2
Triostib (sodium sb 111 gluconate)	34	20	1·6
Antimonyl III EDTA	22	11	2·0
Anthiomaline	17	11	1·5
Tartar emetic	18	9	2·0

TWSb in doses up to 900 mgm./kgm. did not cure any of the mice although it killed up to 50% of the worms. According to these results, Fouadin is the most active of the compounds studied, but it is considered that the therapeutic index of all these antimonial compounds is low and that there is no great difference between them. *F. Hawking*

HUANG, Ming-Hsin, CHIANG, Shao-Chi & LU, Cheng-Wei. **Schistosomiasis Dwarfism.** *Chinese Med. J.* Peking. 1960, May, v. 80, No. 5, 437–40. [11 refs.]

This paper in effect is a résumé of previous papers by Chinese workers on this aspect of the consequences of *Schistosoma japonicum* infection [*e.g.* this *Bulletin*, 1957, v. 54, 1329; 1959, v. 56, 181; 1960, v. 57, 51].

A. R. D. Adams

CONDY, J. B. **Bovine Schistosomiasis in Southern Rhodesia.** *Central African J. of Med.* 1960, Sept. v. 6, No. 9, 381–4, 4 figs. [24 refs.]

During 1955, 2,509 cattle were examined for intestinal schistosomiasis and adult worms were found in mesenteric veins, giving an overall incidence of 69·15%. The cattle came from a widely scattered area. The adult schistosomes were easy to find.

442 eggs, all containing miracidia in which flame cell movement could be seen, and obtained from lesions in the urinary bladder, were measured. The mean length was 248μ, mean breadth 74μ, mean breadth 50μ from non-spiked end 35μ. All had the typical shape of *Schistosoma mattheei*, but measurements differed markedly from those of ALVES [this *Bulletin*, 1950, v. 47, 375] which were 200μ, 64μ and 50μ respectively.

From observations in cattle, it appears that bovine schistosomiasis is not of great economic significance in Rhodesia.

S. bovis infection has been recorded in a 13-year-old boy in the Transvaal [*ibid.*, 1953, v. 50, 733], and more recently PITCHFORD [*ibid.*, 1960, v. 57, 143] found eggs indistinguishable from those found in cattle in human urine and faeces with an incidence up to 23%. ALVES [*ibid.*, 1959, v. 56, 740] found eggs of *S. mattheei* (possibly *S. bovis*) in 10 out of 200 human autopsies in appendix,

bladder, liver and rectum, with slight evidence of damage. Papular dermatitis caused by *S. bovis* cercariae has been described by COSTA (*Ricerca Sci.*, 1954, v. 24, 569). *Philip Manson-Bahr*

SZIDAT, L. & DE SZIDAT, Ursula C. Eine neue, Dermatitis erzeugende Cercarie der Trematoden-Familie Schistosomidae aus *Tropicorbis peregrinus* (D'Orbigny) des Rio Quequén. [**A New Dermatitis-Producing Cercaria of the Schistosomidae Family from** *Tropicorbis peregrinus* **from the Quequén River, Argentina**] *Ztschr. f. Parasitenk.* 1960, v. 20, No. 4, 359–67, 9 figs. [15 refs.]

IWASAKI, H. [**Studies on the Miracidium of** *Gigantobilharzia sturniae* **(Tanabe, 1948). 1. Morphology of the Miracidium of** *G. sturniae*] *Japanese J. Parasit.* 1960, Oct., v. 9, No. 5, 575–81, 2 text figs. & 8 figs. on pl. [30 refs.] [**2. Ecology of the Miracidium of** *G. sturniae* **(Tanabe, 1948)**] *Ibid.*, 582–8, 5 figs. & 7 charts. [26 refs.] [**3. Egg Development of the** *G. sturniae* **(Tanabe, 1948)**] *Ibid.*, 589–95, 16 figs. on 4 pls. [17 refs.] [In Japanese.] English summaries.

TANAKA, M. [**Studies on** *Trichobilharzia physellae* **in Oki Islands. 1.** *Trichobilharzia physellae* **found in Wild Ducks in Oki Islands**] *Japanese J. Parasit.* 1960, Oct., v. 9, No. 5, 596–603, 9 figs. on 2 pls. [19 refs.] [**2. Four Kinds of Schistosome Cercariae parasitic in** *Lymnaea japonica* **in Oki Islands**] *Ibid.*, 604–9, 7 figs. [**3. Experimental Infection of Domestic Ducks (***Anas platyrhyncha domestica***) with a Schistosome Cercaria parasitic in Fresh Water Snails** *Lymnaea japonica*] *Ibid.*, 610–14, 4 figs. on 2 pls. [**4. Experimental Infection of the Snails,** *Lymnaea japonica* **with the Miracidia of** *Trichobilharzia physellae*] *Ibid.*, 615–19, 3 figs. [In Japanese.] English summaries.

ITO, Y. [**Studies on** *Trichobilharzia corvi* **(Yamaguti, 1941). 1. Morphological Studies on the Adult**] *Japanese J. Parasit.* 1960, Oct., v. 9, No. 5, 556–63, 17 figs. (11 on 2 pls.) [**2. Studies on the Structure of the Eggs and Miracidia**] *Ibid.*, 564–74, 23 figs. on 4 pls. [31 refs.] [In Japanese.] English summaries.

WRIGHT, C. A. **Relationships between Trematodes and Molluscs.** *Ann. Trop. Med. & Parasit.* 1960, Apr., v. 54, No. 1, 1–7. [19 refs.]

" An attempt is made to show that the concept of the 'genetic species' is a valuable one in the taxonomy of the digenetic trematodes, and that it is only by accepting this basis that more constructive approaches can be made towards trematode taxonomy and to a better understanding of the fluke diseases of man

and animals. The digenetic trematodes do, in fact, occur in 'actually (or potentially) interbreeding natural populations', and these populations are delimited by the distribution patterns of their molluscan intermediate hosts. It is emphasized that host-restriction between the larval stages of flukes and their molluscan hosts is usually much greater than it is between the adult forms and their vertebrate hosts. Suggestions as to possible methods of formation of new host-parasite relationships are made, particularly in the case of flukes which have a free-swimming miracidium."

WENG, Hsin-Chih, CHUNG, Huei-Lan, HO, Lien-Yin & HOU, Tsung-Ch'ang. **Studies on Clonorchiasis sinensis in Past Ten Years.** *Chinese Med. J.* Peking. 1960, May, v. 80, No. 5, 441–5. [26 refs.]

This paper constitutes a summary of studies by Chinese workers on clonorchiasis, with a bibliography of 26 papers published by them on the subject.

Chloroquine in substantial dosage gives a reasonably satisfactory cure rate, and in cases of failure a combined treatment with chloroquine and emetine, though toxic, may succeed. Prevention of acquirement of the infection, through education and propaganda, is easy in a well organized and disciplined community. *A. R. D. Adams*

NAGATY, H. F., EL-GINDY, M. S. & ABDEL MAGEED, S. M. **On the Morphology, Anatomy and Trematode Infection of some Lymnaeid Snails from Egypt with special reference to Fascioliasis.** Reprinted from *J. Egyptian Vet. Med. Ass.* 1959, Jan. & Apr., v. 19, Nos. 1/2, 51–77, 54 figs. on 4 pls. & 1 map. [15 refs.]

The serious nature of the fascioliasis problem in Egypt has stimulated this work on the potential intermediate hosts. Four species of *Lymnaea* are reported and described in considerable detail together with the larval trematodes by which they were found to be parasitized. The species are *L. stagnalis*, *L. truncatula*, *L. columella* and *L. caillaudi*. The last of these species is the principal host of *Fasciola gigantica* and high infection rates are reported. A single specimen of *L. truncatula* was found to be infected with *Fasciola* larvae and this is the first record for this host-parasite association in Egypt. *C. A. Wright*

NAGATY, H. F. & KHALIL, H. M. **Piperazine Adipate in *Heterophyes heterophyes* and other Helminth Infections.** [Correspondence.] *Lancet.* 1960, Apr. 30, 978.

The authors, from Cairo, have previously found piperazine adipate and citrate effective in various helminth infections, including those due to *Heterophyes heterophyes* [this *Bulletin*, 1956, v. 53, 768]. They have now tried piperazine adipate in out-patients at a rural clinic near Damietta where *Heterophyes* is endemic. The dose varied between 0·9 and 4·5 gm. daily for 2 to 10

days, with a total dosage of 6·3 to 22·5 gm. Stools were examined every other day for a month. The results are shown below.

Infection	No. of cases treated	Total dose of piperazine (gm.)	Duration of treatment (days)	Cured cases
Heterophyes	20	6·3–22·5	2–10	11 (55%)
Ascaris	3	6·3–18	4–7	3 (100%)
Trichocephalus	2	6·3 & 12·6	7	2 (100%)
Trichostrongylus	1	21·3	6	1 (100%)
H. nana	1	18·9	7	0
Enterobius	1	18·9	7	1 (100%)
Ancylostoma	1	6·3	7	0

Of the 20 patients with *Heterophyes* only, 8 ceased to pass ova after 4 to 5 days and 3 after 6 to 7 days. One of the patients with *Trichocephalus* [*Trichuris*] was also infected with *Heterophyes* and the other with hookworm and *Ascaris*: stools were negative for ova of all species except hookworm. The patient with *Trichostrongylus* was also infected with *Heterophyes*. *Trichostrongylus* ova disappeared in 3 days but *Heterophyes* ova persisted.

A patient with *Enterobius* and *Hymenolepis* was also infected with *Heterophyes*. Only *Enterobius* ova disappeared from the stools.

Some of the patients taking more than 3·6 gm daily had slight dizziness, but otherwise side effects were few. The general condition of the patients improved.

H. J. O'D. Burke-Gaffney

See also p. 363, HEINIVAARA & KAIPAINEN, (i) **Studies in Bone Marrow in "Incipient" Tapeworm Anaemia. Comparison of the Size of Erythroid and Myeloid Cells.** (ii) **Comparison of the Size of Metamyelocytes in Different Diseases.**

KAIPAINEN, W. J. & VUORINEN, Y. V. **Cases of Pernicious Anaemia with Previous Pernicious Tapeworm Anaemia.** *Ann. Med. Intern. Fenniae.* Helsinki. 1960, v. 49, No. 3, 165–8.

"Pernicious anaemia was established 2–15 years later in 5 out of 360 cases with a history of pernicious tapeworm anaemia. Each case showed after expulsion of the worm an anaemia-free interval during which the patients were given no anti-anaemia therapy."

WARIS, E. **Dichlorophen in the Treatment of Diphyllobothriasis.** *Ann. Med. Intern. Fenniae.* Helsinki. 1960, v. 49, No. 3, 225–34. [21 refs.]

Dichlorophen was used in the treatment of 121 patients infected with the fish tapeworm, most of whom were suffering from some other coincident disease. As this drug causes destruction of the worm, cure cannot be tested for by finding the head. The authors used follow-up stool examinations at two weeks, one month, and three months.

When used in a dosage of 6 gm. given on one day, 10 out of 19 patients were not cured. When 6 gm. were given on two successive days, 26 out of 73 followed up were not cured, or 64% probably were. Some of these had a stool check at one month but not at three months so the success was not certain. An important point was that only mild side effects were noted in 10%, and the drug could be given to out-patients without preparation.

The author compares these results with those published for treatment with male fern (68%–93% success in different series) and with mepacrine (62% success) and concludes that in this dosage dichlorophen is not quite so effective but that it is less toxic, and can be used in ambulant patients and in those suffering from other diseases.

[These results are similar to those obtained in *Taenia* infections (this *Bulletin*, 1959, v. 56, 747).] *A. C. E. Cole*

VOELKER, J. Zwei neue Cestoden der Gattung *Inermicapsifer* in *Procavia capensis welwitschii* Gray. [**Two New Cestodes of the Genus** *Inermicapsifer* **in** *Procavia capensis welwitschii*] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1960, v. 11, No. 3, 316–24, 5 figs. [10 refs.]

PIRINGER, W. A., LUQUE, J. M. & MEZEY, K. C. **Destruction of** *Hymenolepis nana* **Eggs** *in vitro* **by the Action of Various Anthelmintic Drugs.** *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1960, v. 11, No. 1, 51–6, 6 figs. [12 refs.]

Eggs of *Hymenolepis* were obtained as an emulsion of heavily infected faeces in saline; to this, drugs were added as an equal volume of aqueous solution. After 5–10 minutes at room temperature, a drop of the mixture was examined microscopically.

When exposed in this way to 0·5% hexylresorcinol the eggs showed swelling of the vitelline membrane, contraction of the oncosphere and disorganization of the internal structure and arrangement of hooklets. With lower concentrations of hexylresorcinol (down to 0·03%) the membranes swelled and ruptured and the contents were expelled. At 21°C. these changes occurred in 1–2 hours; at 37°C. they occurred more quickly. With proteolytic ferments like ficin or papain, in 2 or 4% concentration, the hyalino-protein substance inside the vitelline membrane was slowly expelled after which the oncosphere changed to an amorphous brown structure and the hooklets became invisible. The changes in the oncosphere resembled those produced by low concentrations of hexylresorcinol. With the base, acridilamino (A) [presumably an amino-acridine compound], in 0·1% concentration the changes were slower and only 28% of the eggs were destroyed in 1 hour and 44% in 2 hours; but a 0·01% solution destroyed all the eggs in 19 hours. A quinoline preparation destroyed only 36% of the eggs in 24 hours. Piperazine and dithiazanine iodide (1%) were practically without action. The most efficient drug for killing *Hymenolepis* eggs was hexylresorcinol; this might be expected to act *in situ* in the intestine.

F. Hawking

RAKOWER, J. **[Echinococcosis. A Survey of One Hundred Cases]** *Harefuah.* Jerusalem. 1960, Nov. 1, v. 59, No. 9, [in Hebrew 261–4, 9 figs. on 2 pls. (14 refs.) English summary 265].

The English summary appended to the paper is as follows:—

"The clinical forms of hydatid disease, its roentgenological aspects, allergic reactions, biological tests, and the different approaches in its treatment are discussed in the light of a review of 100 cases.

"The following localisation of the disease was noted: liver 49%, lung 33% mediastinum 5%, kidney 3%, other organs 10%. The cysts in the liver were multiple in 20% of the patients and in 22% they were infected; in the lung they were multiple in 22% and in 30% they were infected. In the mediastinum the hydatid eroded the vertebrae, the ribs, the aorta, and in one case it caused paraplegia with sphincter disturbances due to pressure on the spinal cord.

"Ten cases of secondary echinococcosis were observed; five in the biliary ducts, three in the peritoneum and one in the pleura (hydatido-thorax). The remaining case of perforation of an hepatic cyst was followed by generalised echinococcosis of the peritoneum and parasitic emboli in the lung and brain (sepsis echinococcica).

"The Casoni test was positive in 78%, and the Weinberg test in 60% of the patients. However, these reactions were frequently positive in non-echinococcic patients. An eosinophilia above 7% was noted in 25% of the patients only."

TALAAT, S. M. **Multiple Hydatid Cysts of the Liver.** *J. Egyptian Med. Ass.* 1960, v. 43, Nos. 7/8, 570–73, 4 figs. on 2 pls.

PREVITERA, L. La diffusione dell'anchilostomiasi nel territorio di Barcellona P.G. (Messina). **[The Spread of Ankylostomiasis in the District of Barcellona P.G. (Messina)]** *Nuovi Ann. d'Igiene e Microbiol.* 1960, May–June, v. 11, No. 3, 221–6.

Barcellona Pozzo di Gotto is a busy agricultural town of 31,802 inhabitants, situated on the Tyrrhenian coast in the Milazzo plain: many roads from inland places converge on it. The author outlines its climatic and topographical features and he underlines the abundance and height of the ground water, held between the clay strata and often springing to the surface to form pools and streams. The hot and humid conditions which prevail favour mixed farming and other intensive cultivation.

The Ankylostomiasis Centre provides free facilities for the examination of stool specimens, including routine examinations of stools from food handlers, and for investigating family contacts.

A total of 886 cases of hookworm infection were ascertained during 1954–59, and 631 of these were in agricultural workers. Women pick most of the produce in the market gardens and over 60% of those found infected were female subjects. Many children were affected. When the notifications are related to the population of each separate district and expressed as the annual incidence rate per 1,000, the figures obtained range from one per 1,000 for the more central parts of the town to over 73 per 1,000 for predominantly agricultural areas. The notifications reach their peak during July to October.

The author concludes that ankylostomiasis in Barcellona Pozzo di Gotto is a rural disease and is closely associated with occupation in agriculture.

J. Cauchi

YOSHIDA, Y., NAKANISHI, Y., SHIMATANI, T. & MATUO, K. **Comparative Studies on the Anthelmintic Effect of Bephenium Hydroxynaphthoate, Tetrachlorethylene, 1-Bromo-β-Naphthol and 4-Iodothymol against the Human Hookworm.** *Japanese J. Parasit.* 1960, Oct., v. 9, No. 5, 620–28, 1 fig. [28 refs.]

The English summary appended to the paper is as follows:—

"Bephenium hydroxynaphthoate which was recommended as a new anthelmintic by Goodwin *et al.* [this *Bulletin*, 1959, v. 56, 639] was compared with tetrachlorethylene, 1-bromo-β-naphthol and 4-iodothymol in the treatment of hookworm infections in Kumihama-cho, Kyoto Prefecture, a farm village of middle Japan. The hookworm incidence in the experimental field was 32.9%. In calculating the number of expelled hookworms, *Ancylostoma duodenale* and *Necator americanus* were 278 (20.7%) and 1,062 (79.3%), respectively.

"The anthelmintic effect against hookworms with a single dose of 2.5 or 4.0 g of bephenium hydroxynaphthoate was approximately equal to that of a single dose of 4.5 g of tetrachlorethylene. Bephenium hydroxynaphthoate was inferior to 1-bromo-β-naphthol and superior to 4-iodothymol in the anthelmintic effect. The side-effects of bephenium hydroxynaphthoate were seen in a considerable percentage, but not as toxic and not in so many cases as compared with the other three anthelmintics. It is unnecessary to take any purge with these anthelmintics from the view-point of their efficacy and side-effects. It was reconfirmed that bephenium hydroxynaphthoate has a marked effect against roundworms."

STEMMERMANN, G. N. & NAKASONE, N. *Strongyloides stercoralis* **Infestation. Malabsorption Defect with Reaction to Dithiazanine Iodide.** *J. Amer. Med. Ass.* 1960, Nov. 5, v. 174, No. 10, 1250–53, 4 figs.

"A case of *Strongyloides stercoralis* infestation presented as a malabsorption syndrome. The patient died of peripheral shock after receiving a comparatively small quantity of dithiazanine iodide. The drug is a cyanine dye which, under ordinary circumstances, is sparingly absorbed. In the present case, however, there was visual evidence of the dye in lymphatic channels of the gastrointestinal tract.

"The unexpected absorption of this drug is explained on the basis of increased vascularity of the inflamed gastrointestinal mucosa, combined with a slow transit of the dye through the intestine. It is recommended that dithiazanine not be used in patients with heavy strongyloid infestation until the presence of a malabsorption defect has been ruled out."

RUDAT, K. D. & WILLINSKY, C. Über die Vernichtung von Wurmeiern bei Anwendung der natürlichen Kompostierung. [**The Destruction of Helminth Eggs by Natural Composting**] *Ztschr. f.d.g. Hyg. u. ihre Grenzgebiete.* Berlin. 1960, Oct., v. 6, No. 10, 685–92, 6 figs. [11 refs.]

In East Germany the disposal of municipal and slaughter-house wastes by composting methods is becoming increasingly important. Of great interest is

the question of whether these procedures destroy pathogenic organisms and helminth eggs and if so to what extent.

In this paper the authors consider only the destruction of *Ascaris* ova which are known to be particularly resistant and remain viable for years in sewage sludge and soil. There is reference to work on Indore composting which will destroy these ova, but particular emphasis is directed to the success of methods of composting introduced by ROHDE in Berlin [references are given]. The essentials of this method are here described with some photographs.

In order to examine precisely the effects of composting, experiments were conducted which are described. There is an account of methods employed to obtain suspensions of *Ascaris* ova. There are photographs of living and developing ova and also of ova which have been damaged by composting. The ova were placed in Petri dishes and were counted before and after introducing the dishes into the compost heaps. Over 1,000 individual tests were made in different composting installations in Berlin to observe the rate at which the ova were killed.

The conclusions were that *Ascaris* ova were destroyed with certainty in a few days provided the compost heaps were well looked after and that turning over the stacks after about 4 weeks would then destroy the ova which had been on the surface. The temperature is the factor of importance and this must reach 50°C. or more in order to ensure the death of the ova in a few days. This temperature and more is reached in a well constructed and maintained composting system. *M. E. Delafield*

SORESCO, Angela, PANAITESCO, D. & POPESCO, V. Sur un cas de *Larva migrans* viscérale. [**On a Case of Visceral** *Larva migrans*] *Arch. Roumaines Path. Expér. et Microbiol.* 1960, Sept., v. 19, No. 3, 391–5, 2 figs. [11 refs.]

A case of *Toxocara* infection from Bucharest.

LONDERO, A. T. & FISCHMAN, O. Dermatose serpiginosa no interior do Rio Grande do Sul, Brasil. [**Creeping Disease in the Hinterland of the State of Rio Grande do Sul, Brazil**] *Rev. Inst. Med. Trop. São Paulo.* 1960, July–Aug., v. 2, No. 4, 230–34, 1 fig. English summary.

Over a 2-year period the authors studied 39 patients suffering from larvae migrans infections in the city of Santa Maria. Santa Maria is almost in the centre of the state of Rio Grande do Sul and is situated in the valley of the River Jacqui in a deep cleft of the land—the Central Depression, altitude less than 200 m. Here the average temperature is high, rainfall is plentiful and occurs at any time of the year. The lesions were found to occur about 20 days after rain followed by high temperatures.

The ages of the patients ranged from 1 to over 11 years. 20 were aged 1–4 years, 13 were 5–10 years and 6 were 11 or over. In the youngest group the lesions were found as often on the buttocks as on the feet and more than on the hands; in those aged 5–10 years lesions were still very frequent on the feet

but there were also lesions on the legs, hands, and forearms; in those aged 11 years or more, 4 had lesions on the feet, 1 on the legs and 1 on the trunk. 78% of the patients were less than 7 years old, which the authors consider demonstrates definitely that the infection is acquired near to where the children live; it is often limited also to children of the same family or near neighbours. Larvae of *Ancylostoma braziliense* were found in sandhills where the children played but which were frequented by cats; they were also found in 1 dog and 2 cats at autopsy.

The authors regard the cat as the main source of infection since (1) it carries a much heavier load of infection by *A. braziliense* while the dog has a heavier load of *A. caninum*; (2) the cat is more likely to use the sandhills for defaecating; (3) no case was found in families living on the banks of some nearby rivers frequented only by dogs. *W. K. Dunscombe*

WHARTON, R. H. **Studies on Filariasis in Malaya: Field and Laboratory Investigations of the Vectors of a Rural Strain of** *Wuchereria bancrofti*. *Ann. Trop. Med. & Parasit.* 1960, Apr., v. 54, No. 1, 78–91 [26 refs.]

This paper records investigations to determine the vector of *Wuchereria bancrofti* in an isolated rural population in Malaya, and also compares the development of rural and urban strains of *W. bancrofti* in *Culex pipiens fatigans*.

A night-blood survey of 193 local Malays gave a *W. bancrofti* microfilaria rate of 10% (20 out of 193) and a *Brugia malayi* microfilaria rate of 11% (22 out of 193), including 7 infected with both parasites. The microfilariae of *W. bancrofti* were nocturnally periodic; there was virtually no filarial disease.

Trapping of adult mosquitoes continued for 4 years; human-bait net traps and bare-leg catching gave equivalent results. *C. p. fatigans* and *Aedes* species were very scarce; other species of *Culex*, *Mansonia* and *Anopheles* were common, Dissections of all species totalled over 6,000, but *W. bancrofti* larvae were found only in 1 out of 847 *M. annulata* and 3 out of 502 *Anopheles letifer*; one of these *A. letifer* contained infective larvae. [Later examinations showed that this anopheline is probably a new species, closely resembling *A. letifer*; the name *letifer* however is used throughout the paper.] *Brugia malayi*-type larvae were found in *M. longipalpis* [*dives*], *M. annulata* and *M. uniformis*. In all-night trapping, *A. letifer* and *Mansonia* were caught in much larger numbers outside houses than indoors, whereas *Culex* species tended to prefer indoor bait.

In artificial feeding experiments 4 species of *Anopheles*, 5 species of *Culex* and 5 species of *Mansonia* were fed on carriers of *W. bancrofti* from the rural endemic area, and dissected 11·5 to 16·5 days later. *A. letifer* proved to be a good host, all larvae present in 5 out of 9 specimens dissected on the 15th day being stage III. *C. p. fatigans* was a poor host; 13% out of 529 dissected contained larvae, but only 5% contained mature larvae. Development in *Mansonia* did not proceed beyond stage II.

Observations on the intake of microfilariae by *C. p. fatigans* showed that this mosquito ingests more microfilariae than would be expected. The mean weight of blood meals was 4·1 mgm., but the mean intake of microfilariae was equivalent to the number present in 12·7 cmm. of blood.

The following table shows the results of experiments to compare the development of rural and urban strains of *W. bancrofti* in *C. p. fatigans* from a colony maintained in the Kuantan laboratory.

TABLE

Showing the results of experiments in which *C.p. fatigans* mosquitoes were dissected 11·5–16·5 days (mainly 12·5–16·5 days) after feeding on carriers with rural or urban strains of *W. bancrofti*.

No. of microfilariae per 1 cmm. (x)	Carrier No.	No. of mosquitoes dissected	No. of larvae per mosquito		Percentage of mosquitoes		No. of stage III larvae per infective mosquito (c)	Index of experimental infection $\frac{a \times b \times c}{x}$
			Mean	Range	Infective (a × 100)	Survived* (b × 100)		
Rural (Pahang) strains								
0·2	I	278	0·1	0–2	4	99	1·1	0·2
0·3	I	33	0·1	0–3	3	97	2·0	0·2
0·8	II	124	0·2	0–2	6	99	1·1	0·08
1·1	III	94	0·6	0–6	7	89	1·4	0·09
Urban (Singapore) strains†								
0·9	IV	56	5·3	0–55	75	85	6·6	4·0
3·0	V	52	16·4	1–80	95	83	10·0	2·6
11·4	V	30	26·9	1–81	97	90	22·3	1·7

* Calculated on survival figures to the 13th day.
† Mosquitoes were flown to Singapore, fed on carriers, and flown back to Kuantan; survival was determined from those mosquitoes which arrived back alive in Kuantan.

The index of experimental infection has been modified to allow for the effect of different microfilarial densities, and now represents the number of infective larvae per mosquito when the microfilaria count is 1 per cmm. With *C. p. fatigans* the index for rural strains of *W. bancrofti* varied from 0·08 to 0·2 with a mean of 0·14, whereas for urban strains it varied from 1·7 to 4·0 with a mean of 2·8. Thus *C. p. fatigans* was roughly 20 times more efficient as a vector for urban than for rural strains. *A. letifer* with a mean index of 2·5 was as good a host for rural strains as *C. p. fatigans* was for urban strains. [On the figures given in the table 4·0 should apparently be 4·7.]

In discussing these results the author speculates on the problem of the spread of *W. bancrofti* infection through Asia and the Pacific territories. The parasite has adapted to a wide range of mosquito hosts, and in the process some strains "have lost much of their affinity for *C. p. fatigans*". It is therefore difficult to predict how any particular strain of *W. bancrofti* will develop in *C. p. fatigans*; differences in developmental pattern appear to be due mainly to the parasite and not to the mosquito.

[This paper should be read in the original by anyone interested in filariasis and its transmission. The finding of more and more small foci of *W. bancrofti* infection in remote rural areas raises the interesting possibility that the parasite originated as a rural infection and that it is the urban strains rather than the rural strains that have become adapted to a new vector, *C. p. fatigans*. On the practical side, the findings illustrate the great importance of parasite strain in any artificial feeding experiments, and the need to combine laboratory and field work when trying to assess the importance of any particular mosquito as a vector.] *T. Wilson*

EDESON, J. F. B., WHARTON, R. H. & LAING, A. B. G. **A Preliminary Account of the Transmission, Maintenance and Laboratory Vectors of** *Brugia pahangi*. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1960, Sept., v. 54, No. 5, 439–49, 1 fig. [10 refs.]

Brugia pahangi occurs as a natural infection in various species of forest and domestic animals in parts of East Pahang, Malaya, where infection with the semi-periodic *B. malayi* is endemic in the human population [this *Bulletin*, 1960, v. 57, 1087]. The present paper describes the transmission of *B. pahangi* under laboratory conditions, its rate of development in cats, and its development in various species of mosquitoes.

Armigeres obturbans [*subalbatus*] was found to be an efficient laboratory host for *B. pahangi*, and most infections were transmitted by subcutaneous inoculation of infective larvae from this mosquito, but in one case transmission was by mosquito bite. Forest animals were kept for at least 3 months in the laboratory before inoculation. Microfilariae of *B. pahangi* appeared in the blood of 2 out of 2 slow loris (*Nycticebus coucang*), 11 out of 11 cats, and 1 out of 2 civet cats (*Paradoxurus hermaphroditus*), the pre-patent periods being 81–91 days, 59–83 days, and 96 days respectively; 18 other cats died at varying periods after inoculation, and developing larvae were recovered from 12 of them. Attempts to infect macaque monkeys and other animals were unsuccessful (*Macaca irus* 4, *M. rhesus* 1, *M. nemestrina* 1; squirrels, *Callosciurus* spp., 2; tree-shrews, *Tupaia glis* 6; guineapigs 4).

Very high microfilaria counts have been recorded in several of the infected cats for long periods, in one instance up to 2½ years after the first appearance of microfilariae. Developing and adult *B. pahangi* recovered from cats which died or were killed showed that the rate of development was similar to that of *B. malayi* [*ibid.*, 1959, v. 56, 1171], and the worms were found in the lymphatic vessels near the glands, usually close to the site of inoculation.

Mosquitoes were fed on *B. pahangi* carriers with more than 1·0 microfilaria per cmm. of blood, and were dissected 10·5–11·0 days later. Development to the infective stage was recorded in mosquitoes of five genera, *Armigeres, Anopheles, Mansonia, Aedes* and *Culex* (dissected at 14–15 days). *Armigeres obturbans* was a particularly efficient host, whereas *M. longipalpis* [*dives*] was a poor host, although capable of transmitting the infection. This is the reverse of the findings with *B. malayi*, and offers an additional method of identifying a blood infection with *B. malayi*-type microfilariae. The main vector of *B. pahangi* in nature is thought to be *Mansonia annulata*, which was confirmed as a good laboratory vector. *T. Wilson*

BURTON, G. J. **Studies on the Bionomics of Mosquito Vectors which transmit Filariasis in India. II. The Rôle of Water Hyacinth (***Eichhornia speciosa* **Kunth) as an Important Host Plant in the Life Cycle of** *Mansonia uniformis* **(Theobald), with Notes on the Differentiation of the Late Embryonic and Newly Hatched Stages of** *Mansonia uniformis* **(Theobald) and** *Mansonia annulifera* **(Theobald).** *Indian J. Malariology*. 1960, June, v. 14, No. 2, 81–106, 47 figs. on 19 pls. **III. Further Studies on Attachment of** *Mansonia uniformis* **Larvae to Host Plants occurring in** *Pistia* **Tanks in Kerala, South India.** *Ibid.*, 107–29, 43 figs. on 16 pls. **IV. Observations on Larvivorous Activities of Various Fishes in Filarial Areas of Kerala State, South India.** *Ibid.*, 131–56, 42 figs. on 14 pls.

These three papers report further observations on the aquatic stages of the mosquitoes transmitting filariasis in India; Part I was abstracted in this *Bulletin*, 1960, v. 57, 833.

II. Field observations confirmed that water hyacinth (*Eichhornia speciosa*) is the host plant preferred by *Mansonia uniformis*, a vector of *Wuchereria* [*Brugia*] *malayi* in Kerala, India. Egg masses may be laid on the water hyacinth leaves, if touching the water, or on the leaves of *Pistia stratiotes* or *Lemna polyrrhiza*, but the larvae which hatch will attach to water hyacinth rootlets if available. Where *Pistia* alone is present in a tank, only small numbers of *M. uniformis* can be found, and *M. annulifera* predominates.

Characters are described which enable differentiation to be made between the various aquatic stages of *M. uniformis* and *M. annulifera*, even down to the unhatched embryos in the egg masses.

The presence of extensive stands of water hyacinth in some areas, and its close association with *M. uniformis*, give this plant a considerable epidemiological importance locally.

III. Plants were taken from the tanks and ponds, and placed in glass jars containing *M. uniformis* larvae so that attachments could be studied in detail. Larvae attached rapidly to the leaves as well as the roots of *Pistia stratiotes* and to the leaves of *Salvinia auriculata*; also to the roots and rootlets of three grasses, *Leersia hexandra*, *Pseudechinolaena polystachya* and *Brachiaria eruciformis* and the roots of *Colocasia antiquorum*. Small larvae attached to the fine roots of *Lemna polyrrhiza* and the fronds of *Wolffia arrhiza*, larger ones to the nodes and branches of *Chara wallichii* and *Ceratophyllum demersum*.

IV. 14 species of fish collected from tanks and ditches, and *Gambusia affinis* from a stock colony, were studied in the field and in the laboratory as potential predators on the larvae of *Mansonia* and *Culex pipiens fatigans*.

A local fish, *Macropodus cupanus*, was the most larvivorous tested, and it was found in large numbers both in *Pistia* tanks and in stagnant drains. The next most larvivorous, *Ophicephalus gachua* and *O. striatus*, have the disadvantages of preying on other fish, and of being able to leave the water and travel on land for some distance. *Tilapia mossambica* was introduced into India from Africa and has become well-established; it also preys on larvae but not so voraciously as these 3 species. Details of 11 other species are given, including *Gambusia affinis*, which was not a ready feeder on *Mansonia* or *Culex* larvae.

The author considers that *Macropodus cupanus* and *Tilapia mossambica* would be the best fish to use in any attempt at biological control of *Mansonia* and *C. p. fatigans* larvae and pupae in Kerala.

[Although these papers will be of interest mainly to workers in areas where *Mansonia uniformis* and *annulifera* are important vectors, the numerous excellent photographs may give them a wider appeal.] *T. Wilson*

MONEY, G. L. **'Hetrazan' Eosinopenia in Onchocerciasis. A Preliminary Communication.** *J. Trop. Med. & Hyg.* 1960, Oct., v. 63, No. 10, 238–41.

In a course of a study of the eosinophil response to parasitic infection it was found that the initial effect of diethylcarbamazine therapy was a fall in the

level of the circulating eosinophils a few hours after the exhibition of the drug, to be followed a few days later by the expected rise.

Eosinophil counts were done on adult Africans in Mulago Hospital, Kampala. The diagnosis of onchocerciasis was based on the finding of the microfilariae of *Onchocerca volvulus* in skin snips whether clinical signs of the disease were present or not. (Patients with asthma, some blood dyscrasias, postoperative patients and those whose therapy included drugs known to influence the eosinophil count, such as insulin and streptomycin, were excluded.) Chamber counts were done at 8 a.m. and follow-up counts after 4 hours, 6 hours and occasionally after 24.

The effect of 100 mgm. of diethylcarbamazine by the mouth on 6 subjects was compared with 6 controls. 3 subjects in each group had positive skin snips for microfilariae of *O. volvulus*. All of them were long-term tuberculosis patients in an endemic onchocerciasis area. The mean change in the diethylcarbamazine group was 21·6% depression of the basal eosinophil count, while, in contrast, the mean change in the controls was 16.6% increase of the basal eosinophil count. In the diethylcarbamazine group the fall was greater in subjects with positive skin snips than in microfilaria-negative subjects (means 30·3% and 17% respectively, but the numbers were small).

Further results were as follows:

Clinical Status	No. of Patients	Treatment	Depression of basal count %	Range %	No. with fall exceeding 40%
Onchocerciasis with positive skin snips	12	Diethylcarbamazine 100 mgm.	43	0 to −99	9
Free of microfilariae and outside endemic zone	13	Diethylcarbamazine 100 mgm.	24	+17 to −62	3
Onchocerciasis microfilariae in skin	11	Diethylcarbamazine 100 mgm., and Anthiosan, 100 mgm.	21	+105 to −87	5
Onchocerciasis ocular and dermal lesions, positive skin snips	6	Suramin, 1 gm., intravenously	8	+15 to −30	0
Onchocerciasis	12	Corticotrophin, 40 mgm., intramuscularly	56	+10 to −100	10

The results of these investigations suggest that diethylcarbamazine eosinopenia in onchocerciasis is partly due to allergic reactions and the release from the worms of nitrogenous, presumably histamine-like, substances which cause eosinopenia by acting through the pituitary-adrenal axis. The partial block by mepyramine maleate is consistent with this view. The smaller fall in subjects free of onchocerciasis may be due to the drug itself.

From the practical angle it is apparent that the phenomenon may be useful in the diagnosis of onchocerciasis and possibly of other filariases.

[This is a careful and stimulating piece of work.] *Philip Manson-Bahr*

ARNOULT, J. & D'AUBENTON, F. Compte rendu d'une mission hydrobiologique en Afrique Occidentale, relative à la destruction des gîtes larvaires de *Simulium damnosum*, vecteur de l'onchocercose (15 octobre au 17 décembre 1959). [**Report of a Hydrobiological Mission in West Africa Concerned with the Destruction of Larval Breeding Places of** *Simulium damnosum*] *Méd. Trop.* Marseilles. 1960, Sept.–Oct., v. 20, No. 5, 607–12.

Laboratory experiments described in earlier papers [see D'AUBENTON and BLANC, this *Bulletin*, 1959, v. 56, 961] had indicated that the toxicity of DDT preparations to fish, especially high to fish fry, was due more to petroleum solvents than to the DDT itself. The most satisfactory preparation in this respect was a technical DDT of 30% in a base free from petroleum products, inert and insoluble in water. This had the added advantage of being easy to transport in the field. A first field trial of this preparation was made in the Upper Comoë river in the Upper Volta. DDT was applied at a dosage of 15 p.p.m., at least 30 times the concentration required to kill *Simulium* aquatic forms, in order to observe the effects on fish; the results were wholly satisfactory: no unusual behaviour, no sickness or death. The reservation must be made that DDT should not be applied during the fish breeding season [the early rains, according to previous papers] and the practical dose of DDT should be worked out by entomological observation. Experiments with a malathion preparation indicated that it is more toxic to fish, and less to *Simulium* larvae, than DDT.

A method of keeping *Simulium* larvae in the laboratory is also described. The larvae and their vegetable supports are transported in polythene bags without additional water, for as much as 50 km. They are turned out into large enamel photographic trays containing water only 8 mm. deep, and preferably agitated lightly by compressed air. Pulverized cooked lettuce passed through fine gauze serves for food. Although final conclusions from this experiment have not yet been made, it has been observed that the effect of insecticide is slower in calm water and in the absence of food. The inference is that intoxication results from ingestion. *B. B. Waddy*

RUIZ REYES, F. Cinco años de lucha antisimúlido. [**Five Years of** *Simulium* **Control**] *Bol. Epidemiológico*. Mexico. 1959, Apr.–May–June, v. 23, No. 2, 44–54, 2 maps & 3 charts. [17 refs.]

Attempts to eradicate onchocerciasis from Mexico follow two lines: treatment of sufferers and attacks on the vector. This paper deals with the latter, *i.e.* control of *Simulium ochraceum*. Although there were early experiments with creolin as a larvicide, little progess was possible until 1948 when modern insecticides were tried. By 1954 a large-scale pilot plan was drawn up, the site being the basin of the River Despoblado on the S.W. Pacific coast of Mexico. With an area of 945 km.^{2}, this has a population of some 5,000, increasing to 8,000 or 9,000 during coffee harvesting. The proportion affected by onchocerciasis is high, being about 60% of the permanent inhabitants.

Rainfall is high, especially in the wet season (April to October) and there are over 800 streams (total length 338 km.) discharging into the main river which runs for 55 km. Some 20 months were required to make an adequate hydrographic map of the area.

The main attack against the vector was by larvicides applied to all streams at 15- to 20-day intervals (*i.e.* less than the 20–25-day development of the larvae). DDT or dieldrin were mainly used, usually as wettable powders. The insecticides were applied to streams continuously over 30-minute periods after calculation of their rate of flow to give 3 to 5 p.p.m. DDT or 0·00025 p.p.m. dieldrin. [This must be a miscalculation, both from other published evidence and from examination of the tables appended. It should be 0·25 p.p.m. dieldrin.] The antilarval work was planned so that larviciding teams visited each stream of their assigned zone regularly. Records of biting activities of the main Simuliids were also collected and data from four large estates are given to show the effects of treatment.

In addition to the use of larvicides all buildings on the coffee estates were sprayed with dieldrin and this added to the control effect. Some trials of clearing vegetation along the streams were not, however, successful in deterring oviposition by *Simulium* females. The results were considered very satisfactory and throughout the control area there has been absence of larvae and considerable reduction of adults and their biting activity. In conjunction with the medical part of the programme (administration of diethylcarbamazine) this should give hopes of eliminating onchocerciasis. *J. R. Busvine*

KOMIYA, Y., KOBAYASHI, A., OGAWA, H. & KUMADA, M. **[Mass Treatment of Oxyuriasis with Pyrvinium Pamoate (Poquil)]** *Japanese J. Parasit.* 1960, Oct., v. 9, No. 5, 551–5. [In Japanese.]

The English summary appended to the paper is as follows:—

" Results of mass-treatment of enterobiasis with Pyrvinium pamoate (Poquil) are described. Two different forms of the compound, capsule and syrup, were given to the patients harbouring pinworms in a single dose of 5 mg. per kg. of body weight. Two weeks after treatment, negative swabs for seven consecutive days were chosen as the criterion of cure.

" The cure rates obtained with Pyrvinium pamoate in the respective forms were 93·9% (46 out of 49) with the capsule form drug, and 88·3% (31 out of 35) with the syrup form one.

" Both forms of the drug were well accepted and tolerated, and no untoward reactions were encountered in the great majority of the patients (117 out of 125), except for a few children (8 out of 125) who complained of some slight symptoms such as nausea, headache, vomiting or stomach ache.

" The above results indicate that Pyrvinium pamoate (Poquil) in a single dose of 5 mg./kg. is a satisfying drug for the mass-treatment of oxyuriasis."

[See this *Bulletin*, 1960, v. 57, 162.]

CHUTE, R. M. & COVALT, Dorothy B. **The Effect of Body Temperature on the Development of *Trichinella spiralis* in Bats.** *J. Parasitology.* 1960, Dec., v. 46, No. 6, 855–8. [12 refs.]

" 1. *T. spiralis* will regularly develop to the adult stage in the intestine of bats held at 34 and 30 C, but only two adults were found in 58 infected bats held at 5, 23, and 26 C.

"2. Two muscle larvae developed in one of two bats infected with 500 larvae and held at 34 C for 30 days.

"3. Lowered host temperature, for the periods of time reported, may inhibit the development of the parasite without resulting in their elimination from the host."

WARDA, L. Działanie preparatów piperazynowych na jelitowe postacie włośni (*Trichinella spiralis*). [**The Action of Piperazine Preparations on Intestinal Forms of** *Trichinella spiralis*] *Archiwum Immunol. i Terapii Dośw.* Warsaw. 1960, v. 8, No. 2, 327–46. [21 refs.] English summary.

In an investigation of the effect of piperazine on *Trichinella spiralis* it was found that adult worms lost the power of movement on exposure *in vitro* to concentrations exceeding 0·06%; the time after which the effect appeared was prolonged by neutralizing the base with citric acid or acidifying with hydrochloric acid. Female worms were somewhat less sensitive than males.

The effect of piperazine was also studied in experiments on 253 mice which were infected orally with 100 larvae; 190 mice were treated with the drug orally in a dose of 150–600 mgm. per kgm. for 6 days and the remainder served as controls. A reduction in the number of worms in the small intestine compared with the controls was observed on examination after 7 days, and ranged from 81·1% to 97·3% in males and from 25·1% to 32·8% in females; piperazine adipate and piperazine hexahydrate were equally effective, and the reduction in the number of males was increased to 97·3% by the simultaneous administration of 20 mgm. of magnesium oxide as a neutralizing agent. In the diaphragm a reduction of lesser extent was observed in the number of worms, and a reduction of 32·1% could be achieved with a single dose of 300 mgm. per kgm. of piperazine hexahydrate administered by duodenal sound. *D. J. Bauer*

DEFICIENCY DISEASES

FOOD & AGRICULTURE ORGANIZATION OF THE UNITED NATIONS. FAO Nutrition Meetings Reports No. 20. Nutrition et alimentation tropicales. Recueil des Conférences du Deuxième Cours de Nutrition pour l'Afrique Noire, Marseille (France), 4 octobre–15 décembre 1955. Vols. I, II & III. [**Nutrition and Food in the Tropics. Proceedings of the Second Course in Nutrition for Tropical Africa, held in Marseilles in October–December 1955**] 2040 pp., illustrated. [Numerous refs.] 1957. Rome.

These volumes record the second of 2 courses in nutrition for persons working in tropical Africa, organized by FAO/WHO in cooperation with the French Government. Although the proceedings took place in 1955 and the volumes are dated 1957 they have only recently been received in this Bureau, owing, it is stated, to printing delays.

The three volumes cover a wide range of relevant subjects and the contributions are by recognized experts, and the course was under the direction of Dr. Marcel AUTRET.

The first volume is divided into 2 parts: (1) general observations, (2) food technology. The second volume contains parts (3) statistical organization and application, (4) nutrition and public health. The third volume concludes with parts (5) food production, (6) nutrition and sociology, (7) surveys, (8) practical nutrition programmes and (9) general.

Each part is divided into sub-sections and contains a varying number of papers, covering a very wide aspect of the subject. It is clear from the number of pages—more than 2,000—that these volumes contain an immense amount of authoritative information which will be of considerable value to those especially concerned with nutrition in Africa. *H. J. O'D. Burke-Gaffney*

COMMISSION FOR TECHNICAL CO-OPERATION IN AFRICA SOUTH OF THE SAHARA [C.C.T.A.]. **Inter-African Nutrition Conference. III Session. Luanda, 1956, Oct. Communications Vols. I & II.** 489 pp.; 877 pp., illustrated. [Numerous refs.] London: Watergate House, York Buildings, W.C.2.

These two volumes give the full texts of the papers submitted to the third meeting of the Inter-African Nutrition Conference, held in Luanda in 1956 [this *Bulletin*, 1957, v. 54, 858].

The papers are presented in their original languages, with summaries or translations in the other official working languages.

The papers were presented under the headings: (1) progress in nutrition in Africa South of the Sahara since the second Conference in 1952; (2) food requirements of mothers, infants and children and their fulfilment; (3) inter-relationships of malnutrition and infections, including blood and intestinal parasites; (4) criteria by which the beneficial effect of better feeding or of improved hygiene may be established; (5) protein-rich foods; (6) development of local resources; (7) nutrition education; (8) nutritional studies; (9) nutrition research.

The sections contained between 8 and 14 papers each and covered a wide field of nutritional subjects. *H. J. O'D. Burke-Gaffney*

ROBINSON, J. J. **Degenerative Heart Disease resembling Beriberi: Autopsy Findings in 12 Cases from Florida.** *Southern Med. J.* 1960, Nov., v. 53, No. 11, 1446–50, 6 figs. [20 refs.]

LUYKEN, R.; LUYKEN-KONING, F. W. M.; OOSTERHUIS, H. K. **Studies on the Physiology of Nutrition in Surinam. I. General Remarks** [LUYKEN & LUYKEN-KONING]. *Trop. & Geograph. Med.* Amsterdam. 1960, Sept., v. 12, No. 3, 229–32, 1 map. **II. Serum Protein Levels** [LUYKEN, LUYKEN-KONING & OOSTERHUIS]. *Ibid.*, 233–6. [13 refs.] **III. Urea Excretion** [LUYKEN & LUYKEN-KONING]. *Ibid.*, 237–42. [15 refs.]

I. The first of these papers is a general introduction to the other two, and to a number of future publications, in which the results of detailed clinical, anthropometric, biochemical and dietary investigations of "normal" persons

in Surinam will be recorded. Three main groups were studied:—*Bushnegroes*, a people of African origin whose dietary staple is cassava and other tubers, with some groundnuts, a little meat and fish, but practically no vegetables; malaria is prevalent (school spleen rate 13–16%) and all children have roundworms or hookworms. *Javanese*, mostly in good employment on a sugar estate or with a bauxite company; their dietary staple is rice, with a variety of vegetables, and fresh and canned fish and milk, with an average daily consumption of 61 gm. protein, 15 gm. being animal protein; tropical infectious diseases are controlled by adequate medical services. Some children of Javanese farmers living on smallholdings under less favourable conditions were also examined. *Amerindians*, one small group living near the coast on a diet from the yield of vegetable farms with a considerable amount of fish.

II. Levels of serum protein in the three groups were compared with the levels in Europeans. Average values (gm./100 ml.) with standard deviations and significances of differences are given in tables. Total protein in Amerindians (7·9 ± 0·7), Javanese (7·5 ± 0·6) and Bushnegroes (7·4 ± 0·6) was significantly greater ($P < 0.01$) in all groups than in Europeans (6·7 ± 0·4); serum albumin was about the same in Amerindians (4·6 ± 0·5), Javanese (4·7 ± 0·4) and Europeans (4·5 ± 0·3), but was significantly lower in Bushnegroes (4·2 ± 0·4); serum gamma globulins in Bushnegroes (1·7 ± 0·4), Amerindians (1·6 ± 0·3), Javanese (1·5 ± 0·4) and Javanese children (1·3 ± 0.5) were significantly much higher than in Europeans (0·9 ± 0·2). There were no significant differences in the levels of other globulin fractions.

The findings are consistent with the theory that levels of serum albumin are related to standards of dietary protein, and that high gamma globulin results from the prevalence of infectious disease. Because of this, levels of total serum protein may be unrelated to standards of protein nutrition.

III. Determinations of the proportion of urea nitrogen to total nitrogen (urea N% : total N) in single specimens of urine—stated by PLATT and HEARD (*Proc. Nutrition Soc.*, 1958, v. 17, ii) to be a good measure for protein supply in a population group—and of the proportion of urea to creatinine (gm. urea: gm. creatinine) were made in Surinam groups, following detailed studies of urea excretion in Europeans and also in rats.

All urine voided for some days by 5 healthy adult Dutchmen was examined for urea N% : total N and gm. urea: gm creatinine. The means with standard deviations and ranges of observations for each of the 5 subjects are given in tables. The mean urea N% : total N for all subjects was 85·5%, and there was no difference between specimens after a heavy meal and fasting morning specimens. The mean gm. urea: gm. creatinine was 15·9, and there were much wider variations.

Two groups of rats were fed respectively on diets with 8% and 20% protein (casein). The urea N% : total N in the high protein rats was 84–88%, showing little difference whether urines were taken after fasting or after feeding; but in the low protein rats the figure was 82·9% after feeding, and low figures (77·6% and 68·7%), indicative of the poor protein intake, only occurred in urines taken after fasting. Findings for gm. urea: gm. creatinine were similar; though low protein rats did show a lower ratio (30·0) than high protein rats (42·4) after feeding, the differences were much more marked in urines taken after fasting (12·1–19·3 for low protein, 35·6–39·2 for high protein rats). The most distinct and constant differences for the rats were obtained by converting the urea content of

urines to a standard specific gravity of 1·01 urine [this relates urea to total dissolved solids in urine]. Values for high protein rats ranged from 1·32 gm.–1·54 gm. and for low protein from 0·64 gm.–0·84 gm.

157 specimens of urine collected from children aged 6–10 years at 10.0 a.m. (*i.e.* before any substantial protein breakfast) in different Surinam groups were compared with 38 controls from Dutch children in Holland, and children on a European diet in Surinam. Urea N% : total N was significantly lower in Bushnegroes (*a.* 53% ±17, *b.* 76% ±9) and Javanese farm-children (79% ±9) than in Javanese Moengo children (85% ±8), Amerindians (80±14), Dutch (82±10) and those on European diets (87±9). There were more marked differences in values of urea gm.: creatinine gm.; Bushnegroes (*a.* 7·5±4·0, *b.* 11·1±5·0), Javanese farm-children (13·7±5·0), Javanese Moengo children (18·8±4·4) and Amerindians (17·8±6·1), all being significantly lower than the controls—Dutch (25·2± 7·0) and those on European diets (28·0±8·4).

These results in the Surinam groups ran parallel with the composition of their diets. The Bushnegroes had the poorest supply of protein, but group *b.* with higher values profited from proximity to the Moengo bauxite company. Similarly, Javanese bauxite employees have a superior diet to Javanese farmers. The findings demonstrate that measurement of urea in a single specimen of urine by these methods can be used as a criterion for the evaluation of protein nutrition; in the human investigations gm. urea: gm. creatinine appeared to be the more sensitive test. The influence of recent feeding upon values found in rats on low protein diets suggest that it is inadvisable to collect single urine specimens for test too soon after a meal. *T. P. Eddy*

CRAVIOTO, J. & DE LA PENA, Carmen. **Influence of the Clinical Type of Malnutrition on the Absorption and Retention of Nitrogen.** *West Indian Med. J.* 1959, Sept., v. 8, No. 3, 212–17, 3 figs.

The authors list names given to severe malnutrition in children. There are those with "magical meaning" (kwashiorkor, tzipitl) and others based on anatomical features (infantile pellagra, *culebrilla*), or on physiopathological changes (dystrophy, dyspepsia), or indicating the aetiology (nutritional oedema, protein malnutrition).

Among the children with chronic severe malnutrition two types can be distinguished. One is a type mostly known as kwashiorkor or *Mehlnährschaden*, the other is represented by the marasmic or atrophic child. The authors consider that the functional difference is quantitative rather than qualitative and that both types share essential features, including even the pancreatic changes. They quote a paper by RAMOS-GALVAN (*Bol. Med. Hosp. Infantil, Mexico*, 1958, v. 15, 875) in which he describes the type of malnutrition in 1,100 patients admitted into the Mexican Children's Hospital in the course of 5 years where he found that the incidence of the clinical type was directly related to the children's age.

The present investigation was undertaken in the same hospital to see whether nitrogen retention differed in the two types. 16 children of the kwashiorkor type and 17 of the marasmus type were investigated and their nitrogen balance was determined 48 hours after their admission, when they were given a diet of whole cows' milk with added cane sugar. There was slightly greater nitrogen retention

in the marasmic group, which was however not statistically significant. The authors emphasize that their findings indicate that the marasmic child may be just as much, or even more, depleted of proteins than the kwashiorkor patient and that it is dangerous to think of protein depletion only in connexion with kwashiorkor.

[For previous studies by the authors and their colleagues see this *Bulletin*, 1957, v. 54, 1346, 1453.] *H. Lehmann*

EDOZIEN, J. C. **The Serum Proteins in Kwashiorkor.** *J. Pediatrics.* St. Louis. 1960, Oct., v. 57, No. 4, 594–603, 3 figs. [64 refs.]

This article is a review of the author's work on serum proteins in healthy and diseased adults and children in Nigeria [see, for example, this *Bulletin*, 1959, v. 56, 759; 1960, v. 57, 275, 746; 1961, v. 58, 115]. There is a valuable collection of 64 references.

Results are given of the examinations of blood of 450 normal Nigerian children, varying in age from 4½ months to 6½ years, 146 children with kwashiorkor on admission to hospital, and a fair proportion of these children after they had successfully been treated with a milk diet.

The total serum proteins, the albumin, the alpha 2 and beta globulin were all lowered in kwashiorkor. The gamma globulin level was more or less the same as in normal children. The changes in the serum protein are also said to be responsible for the reduction in total serum calcium and copper and of the iron binding capacity. The results are set out in detail in 3 figures and 7 tables.

H. Lehmann

MACDOUGALL, Lorna G. & ROSS, G. I. M. **Serum Vitamin B_{12} Concentrations in Kwashiorkor and Marasmus.** *J. Pediatrics.* St. Louis. 1960, Oct., v. 57, No. 4, 589–93. [36 refs.]

8 children in Nairobi with kwashiorkor and 5 with marasmus were examined for their serum vitamin B12 level. The normal level was taken to be 140–900 $\mu\mu$gm. per ml. The average B12 concentration in the children with kwashiorkor was 676 and in the marasmic children—341 $\mu\mu$gm. per ml. 2 of the more severely ill children with kwashiorkor had concentrations of over 1,000 $\mu\mu$gm. per ml. This is thought to be due to liver damage and the high level was found to fall with treatment. *H. Lehmann*

MACDONALD, I. **Hepatic Lipid of Malnourished Children.** *Metabolism.* New York. 1960, Sept., v. 9, No. 9, 836–46, 3 figs.

High liver fat is a particular feature of kwashiorkor, and in contrast to the other type of infantile malnutrition, marasmus, there is in kwashiorkor also a normal amount of subcutaneous fat. The present paper, from the Department of Physiology, University of Witwatersrand, Johannesburg, is concerned with the chemical analysis of liver fat in 15 Bantu children with kwashiorkor and in 24 children dying from causes other than malnutrition.

The iodine value of the following fractions was examined: total lipid, phospholipid, nonsaponifiable, and fatty acids. In addition to the liver fat the iodine number of the depot fat was also determined. The main differences between the livers from children with the clinical diagnosis of malnutrition and those from other children was a lower proportion of nonsaponifiable lipid, a greater saturation of the fatty acids and a failure of the phospholipid fraction to rise with an increasing level of total lipid. *H. Lehmann*

SPRUE

JAIN, S. R. & SEPAHA, G. C. **Parasprue—a Malabsorption Syndrome. Clinical Observations.** *Indian J. Med. Sci.* 1960, Oct., v. 14, No. 10, 861–6.

It is by no means clear on what grounds the claim for "parasprue" as a definite entity is based. These cases, the authors say, resemble tropical sprue to some extent, but do not fulfil all the criteria. CHAUDHURI and RAI CHAUDHURI [this *Bulletin*, 1945, v. 42, 221] used the term "parasprue." Such cases have been labelled "vitamin B deficiency syndrome allied to sprue" by COOK [*ibid.*, 220], and "nutritional diarrhoea" by KARAMCHANDANI and HYDER [*ibid.*, 1946, v. 43, 948]. On the other hand, AYREY [*ibid.*, 1948, v. 45, 357] considered that parasprue is nothing but an early stage of sprue.

50 cases were studied by the present authors. The patients were between 12 and 70 years old. The maximum age incidence in both sexes was in the third decade.

The duration of the disease varied from 3 months to 15 years. Diarrhoea was universally present and the number of motions varied from 3 to 25 daily. The stool was liquid in 21 cases, pale, bulky and frothy in 7. Sore mouth was present in 46 patients, but the remainder had previously suffered from it. Loss of weight was present in 44. Anorexia, gurgling and abdominal distension were present in the majority. Glossitis was present in all—mild in 16, moderate in 20 and severe in 14. Pigmentation of the skin was present in 14; in 6 it was confined to the dorsum of the hands and feet, resembling pellagra. Oedema of the feet was seen in 6. Slight enlargement of the liver was noticed in 31, and splenomegaly in 14 patients.

Microscopically the stools showed no evidence of inflammatory exudate, except occasional pus cells, nor of amoebic dysentery or helminthiasis. There was evidence of carbohydrate indigestion and poor fat absorption. 40% of the patients had a systolic pressure lower than 100 mm. of mercury. Varying degrees of enlargement of the liver were found in 62%.

It is concluded that tropical sprue is rare in tropical populations while parasprue is commonly found in India. The diarrhoea is usually watery. A history of dysentery is obtainable in only 6·8% of patients with tropical sprue, while in parasprue it is more common. These cases do not respond well to folic acid.

Philip Manson-Bahr

HAEMATOLOGY

McGregor, I. A. & Gilles, H. M. **Studies on the Significance of High Serum Gamma-Globulin Concentrations in Gambian Africans. II. Gamma-Globulin Concentrations of Gambian Children in the Fourth, Fifth and Sixth Years of Life.** *Ann. Trop. Med. & Parasit.* 1960, Oct., v. 54, No. 3, 275–80, 2 figs.

This paper concerns itself with the problem of the high gamma globulin in African populations and the question of whether this is due to the higher incidence of infections in these people, or to a racial tendency [this *Bulletin*, 1960, v. 57, 940]. For three successive years groups of about 20 children each were examined for their albumin and globulin levels. One of the groups received antimalarial treatment, in the form of weekly prophylactic doses of chloroquine throughout.

It could be shown that in the malarious children the globulin level and the percentage of gamma globulin were slightly higher than in the protected children but this difference was statistically significant. There were also 4 children who had originally belonged to the protected group, but owing to a change of domicile their malaria prophylaxis had lapsed. It was of interest that these 4 children had gamma globulin values resembling those of the children in the untreated group. *H. Lehmann*

Edozien, J. C. **Biochemical Normals in Nigerians: Chemical Composition of the Blood of Adults** (contd.). *West African Med. J.* 1960, Oct., v. 9 (n.s.), No. 5, 204–7. [24 refs.]

This paper is one of a series which the author is publishing on the normal values for chemical substances in blood and urine of healthy adult Nigerians. All the subjects were healthy adult blood donors and volunteers. Various enzyme levels (transaminases, amylase, pseudocholinesterase, isocitric dehydrogenase), serum iron, magnesium and vitamin A and other values were the same in Nigerians as in normal Europeans. Serum carotene was about four times higher. It is thought that the high carotene concentration is responsible for the yellow, rather than buff, colour of the plasma of Nigerians in Ibadan and also for the bright yellow colour of their subcutaneous fat as seen in operations and post-mortem examinations. This high carotene concentration is however not universal throughout Nigeria and was not seen in blood samples from subjects in Northern Nigeria. The author suggests that the high carotene concentration is associated with the high dietary intake in palm oil, red pepper and leafy vegetables.
H. Lehmann

Ruf, J.; Meyer, G.; Aujard, C.; Ratsiandavana, G.; Combeuil, G.; Pages, A.; Auffret, P.; Frederic, G. Les principales constantes biochimiques du sérum de différents groupes ethniques malgaches et comoriens en rapport avec leur écologie. Deuxième partie: Constantes biochimiques des différents groupes. [**The Principal Biochemical Values in the Serum of Different Malagasy and Comoro Groups in connexion with their Ecology. Part 2. Biochemical Values in the Different Groups**] *Arch. Inst. Pasteur de Madagascar.* 1960, v. 28, 211–39. [41 refs.]

In 12 racial groups from Madagascar the serum levels were determined for the following substances:— calcium, potassium, inorganic phosphate, sodium, sugar, non-protein nitrogen, urea, total protein, albumin, globulin and cholesterol. The results are given in 22 tables and comparisons have been made with values found in Sweden and in other parts of tropical Africa. Except for the blood sugar values, they differ from those found in Europeans. This applies particularly to the serum proteins.

[For Part 1, see this *Bulletin*, 1960, v. 57, 278.] *H. Lehmann*

SONNET, J. & MICHAUX, J. L. **Glucose-6-Phosphate Dehydrogenase Deficiency, Haptoglobin Groups, Blood Groups and Sickle Cell Trait in the Bantus of West Belgian Congo.** [Correspondence.] *Nature*. 1960, Nov. 5, v. 188, 504–5. [18 refs.]

A deficiency of erythrocytic glucose-6-phosphate dehydrogenase (G6PD) is common in African males in Leopoldville, occurring in 21·5% of a sample of 522. In a smaller group of 150 males, there was no correlation of G6PD deficiency with the possession of the blood group antigens AB, A, B, O, or D, D^u, and d, nor with the possession of the sickling gene, nor with the presence of haptoglobin types 1–1, 1–2, 2–2.

In such a population there is therefore considerable danger of haemolytic episodes after the taking of 8-aminoquinolines, sulphones, naphthol, and nitrofurazone. However, the test used, which was semi-quantitative, indicated that the degree of deficiency of G6PD in these Africans was much less than is usual in Caucasians. *Alan B. Raper*

BANNERJEE, D. K. & CHATTERJEA, J. B. **Serum Vitamin B_{12} in Vegetarians.** *Brit. Med. J.* 1960, Oct. 1, 992–4, 1 chart. [20 refs.]

Vegetables are notoriously poor in vitamin B12 and, of the non-plant foods, milk has a much lower content of that vitamin than liver, meat, eggs and fish. For this reason the average vegetarian diet may not have enough vitamin B12 to ensure optimal human nutrition. Yet in India the average red cell and haemoglobin levels of vegetarian communities do not differ significantly from those of non-vegetarians.

To obtain more information the authors examined the serum vitamin B12 in two groups of subjects—vegetarian and non-vegetarian, in the general population and among patients with anaemias. 51 normal non-vegetarians and 10 normal vegetarians showed a considerable difference in their serum vitamin B12 which was, in the non-vegetarian group, 3 times higher (non-vegetarian range 98–940 $\mu\mu$gm. per ml., vegetarian range 36–290 $\mu\mu$gm. per ml.). A similar difference was seen when haematological disorders were investigated. Altogether, including normal subjects, 186 non-vegetarians were compared with 46 vegetarians. The only exception was chronic myeloid leukaemia where the authors confirmed very high B12 levels in the serum and where, in fact, the range in 5 vegetarians was 1,190–3,100 and in 25 non-vegetarians 960–7,200 $\mu\mu$gm. per ml. of serum. *H. Lehmann*

CAZAL, P., IZARN, P. & EMBERGER, J. M. Le diagnostic et le traitement des anémies. [**Diagnosis and Treatment of the Anaemias**] *Montpellier Méd.* 1960, June, v. 57, No. 6, 611–46, 8 figs.

DAVIS, L. R., MARTEN, R. H. & SARKANY, I. **Iron-Deficiency Anaemia in European and West Indian Infants in London.** *Brit. Med. J.* 1960, Nov. 12, 1426–8, 2 figs.

The 47 West Indian children discussed here had all lived their whole life in Britain, and they were compared with 67 indigenous children, the groups being comparable in age and birth weight (statistical details are given). Each group contained normal children, and about equal numbers of sufferers from atopic eczema.

Haematological findings may be summarized as follows:

Clinical groups		Hb (Gm. % ± SD)	MCHC (% ± SD)
W. Indian	with eczema	9·0 ± 1·3	27·6 ± 1·0
	normal	9·2 ± 1·5	29·0 ± 2·8
European	with eczema	10·9 ± 1·0	30·6 ± 2·0
	normal	10·6 ± 0·9	31·4 ± 1·9

The incidence of iron deficiency (MCHC under 30%) was 22·4% in the European, and 53·5% in the W. Indian children, the greatest difference between the races being at the age of 11–13 months. Anaemia in the eczematous children always responded to oral iron, but eczema was not a cause of significantly lower haematological values in either race.

None of the children had intestinal worms, and it was thought that differences in respect of prematurity, excessive growth, and malnutrition could be excluded. Dietary studies were not made, but diet presumably did not affect children aged 5–7 months, and 5 out of 7 W. Indian children of this age were iron deficient; it would seem that these children had begun life with diminished iron stores. The authors think there is an inherent racial difference at the root of these findings. [One place to look for the nature of this difference might well be the dietary habits of the mothers.] *Alan B. Raper*

WU, S. H., HUANG, P. H., CHEN, C. H. & TUNG, T. C. **The Effect of Vitamin B Complex on Hematopoiesis. II. Studies with a Large Group of Rural School Children.** *J. Formosan Med. Ass.* 1959, Jan. 28, v. 58, No. 1, 22–9, 3 figs.

522 children from 2 Formosan rural primary schools showed high incidences of anaemia (42·5–51·3% with Hb <11gm./100ml.), of ankylostomiasis (71·8%), ascariasis (61%), and of signs suggestive of B vitamin deficiencies, particularly angular stomatitis (30–46%), with low urinary excretions of thiamine and riboflavine. They were divided into two groups; each child in group I received one pill daily, containing 50 mgm. ferrous sulphate only; group II received pills containing supplementary vitamins of the B complex, ascorbic acid, methionine, and choline, together with ferrous sulphate in the same dosage. Dosage was maintained in one school for 6 months and in the other (in which children were first wormed with santonin and tetrachlorethylene) for 2 months.

There were slight increases in haemoglobin concentration in group II after one month of treatment, and there was a somewhat faster reticulocyte response than in group I, but there were no significant differences in the blood picture between the two groups, and no improvement in anaemia, at the end of treatment. Hookworm infection remained high, owing either to inadequacy of the original treatment, or to reinfection.

[The authors consider that the lack of response in either group may have been due to the continuously high incidence of hookworms. But they give the average total daily availability of nutrient per head in Taiwan as 2,207 calories with 53 gm. total protein, 40 gm. of which was vegetable protein. They were poor children living in rice and vegetable farms, who could not eat much animal food. It seems possible that a protein/calorie deficiency may have limited the response; this could account for these disappointing results.] *T. P. Eddy*

HEINIVAARA, O. & KAIPAINEN, W. J. **Studies in Bone Marrow in "Incipient" Tapeworm Anaemia. Comparison of the Size of Erythroid and Myeloid Cells.** *Ann. Med. Intern. Fenniae.* Helsinki. 1960, v. 49, No. 3, 169–72, 1 fig. [15 refs.]

———— & ————. **Comparison of the Size of Metamyelocytes in Different Diseases.** *Ibid.*, 173–9, 1 fig. [17 refs.]

Both of these papers are concerned with the "pernicious" anaemia of fish tapeworm infections. In the first, the authors attempt to find whether enlargement of cells of the erythroid and myeloid series in the marrow precedes full megaloblastic change, and if so, which series gives the more sensitive index of this change. They measured the diameters of 100 cells of each sort in the marrow films of 2 persons with the full anaemia, 2 with mild non-megaloblastic tapeworm anaemia, and 2 normal persons. For normal persons, average diameters were: erythrocytes, 7·28μ; polychromatic normoblasts, 8·73μ; metamyelocytes, 11·54μ. For worm infection with mild anaemia, corresponding figures were 7·22μ, 9·49μ, 14·16μ. In megaloblastic marrows the figures were 7·92μ, 12·13μ, 15·88μ. Thus in early anaemia both normoblasts and metamyelocytes increase in size, but the increase is greater in the latter cells; moreover the metamyelocytes show greater variation in size. It is concluded that an estimate of size and anisocytosis in metamyelocytes is the most sensitive index of the onset of megaloblastosis.

In the second paper the above results are applied to a series of 70 patients. The distinctive changes in the metamyelocytes were expressed by stating what percentage of these cells exceeded 14μ in diameter. In 9 patients with pernicious anaemia, these giant cells formed over 71% of their class in all cases. At the other extreme, in 48 patients with miscellaneous diseases they did not exceed 20%, but it may be noted that the list includes the malabsorption and post-gastrectomy syndromes. Values up to 35% were found in tapeworm carriers and several other conditions (9 patients). Values over 35% occurred in 2 tapeworm carriers, a malabsorption syndrome, and an anaemia of unknown origin. The authors regard over 35% of giant metamyelocytes as indicating that a megaloblastic anaemia may be developing.

[Clearly this quantitative approach may find a use in the tropical megaloblastic anaemias; but only experience will show whether it is superior to the qualitative assessment generally used.] *Alan B. Raper*

See also p. 342, KAIPAINEN & VUORINEN, **Cases of Pernicious Anaemia with Previous Pernicious Tapeworm Anaemia.**

HARRIS, I. M., MCALISTER, Joan M. & PRANKERD, T. A. J. **The Relationship of Abnormal Red Cells to the Normal Spleen.** *Clin. Sci.* 1957, v. 16, No. 2, 223–30, 9 figs. [10 refs.]

"1. Sites of destruction of injected red cells, with induced and naturally occurring abnormalities, have been investigated quantitatively by surface counting after ^{51}Cr tagging.

"2. Spherical cells and those with a chemically abnormal surface are selectively retained in the spleen. Non-metabolising cells are destroyed outside the spleen. Sickle and thalassaemic cells are destroyed to an equal extent in intra- and extrasplenic sites."

STRANGWAY, Alice K. **The Hemoglobins, with a Report on Hemoglobins in Four African Tribes.** *Canadian Med. Ass. J.* 1960, Nov. 12, v. 83, No. 20, 1040–46.

Sickling tests were made in the Bié and Camacupa areas of Angola on persons of 4 tribes, the tribal percentages of positive findings (for all ages) being as follows: Umbundu 22·8%, Luimbi 11·2%, Chokwe 14·2%, Songo 25%. In the last 3 tribes the numbers examined were rather small, but the results were similar to those in the Umbundu, which showed a remarkable variation with age; the sickling rate in children under 1 year was 38·2% (115 subjects), from 1 to 44 years the rate showed little variation and was 22·4% (1,438 subjects), while in 123 persons over 45 the rate was only 16·2%. There were differences in incidence according to sex in the Luimbi and Chokwe, but much less in the larger Umbundu group. No conclusions are drawn from these differences.

[The results illustrate a point that has continually recurred in the literature on this subject. It is hardly possible that a mating population with a 22% incidence of the sickling trait should have produced a generation of neonates with a rate of 38%. The difference between the sickling rate in the infants and in the subjects of reproductive age (15–44) in the present study is highly significant ($chi^2 = 18{\cdot}19$ for 1 d.f. according to the abstracter's calculation); but it is by no means acceptable that it is significant of a biological difference—it is at least possible that the difference depends on how the subjects were selected, and this question cannot be answered from the data given. Similar arguments can be applied to the sex differences. Inexplicable differences of this sort were noticed as long ago as 1949 (RAPER, *East African Med. J.*, v. 26, 281), and it is important that such figures should not be applied in population genetics unless the provenance of the subjects is clearly stated.]

The paper goes on to describe 34 examples of sickle-cell anaemia, confirmed in 29 cases by electrophoresis. Ages varied from 4 months to 16 years, and the author has not seen the disease in a person over the latter age in Angola. The clinical and pathological features were consonant with those described elsewhere in Central Africa.

It is also mentioned that in the electrophoresis of 125 specimens of Hb, mostly from known sicklers, one sample showed a fast-moving Hb, not fully identified.

Alan B. Raper

NWOKOLO, C. **The Diagnosis and Management of Sickle Cell Anaemia.** *West African Med. J.* 1960, Oct., v. 9 (n.s.), No. 5, 194–203, 2 figs. [22 refs.]

Dr. Nwokolo, who is the medical specialist in Eastern Nigeria, presents here a summary of his experiences with sickle-cell anaemia. Only little clinical upset will occur before the age of 6 months. By then the disease can present itself in one of 7 different ways:—

1. fever with anaemia and enlarged spleen;
2. haematological crises in a grossly pale and breathless baby, with enlarged spleen, with or without fever;
3. puffiness of some fingers, or hands, or feet in a pale baby, with or without fever;
4 frank osteomyelitis, sometimes bilateral and symmetrical;
5. jaundice with anaemia and enlarged liver, with or without fever;
6. merely a pale baby which is failing to thrive;
7. a pale and lethargic baby.

In older children and in surviving adults the two main characteristic features of sickle-cell anaemia are the repetitive character of symptoms and signs of disease, together with an anaemia which is clinically detectable. Sickle-cell anaemia can be confused with anaemia from other causes occurring in association with sickle-cell trait, with sickle-cell/haemoglobin-C disease, or sickle-cell thalassaemia. For the differential diagnosis laboratory investigations and family studies are essential.

In the management of the anaemia consideration should be given to the fact that an infection, and in the author's experience, malaria, can precipitate a sickle-cell crisis. He is emphatic that sickle-cell anaemia does not protect the individual child against malaria. Other causes of crises are heavy late meals, exposure to a cold wind, or bathing in very cold water. On occasions a long car journey or violent exercise may precipitate a sickle-cell crisis. Avoidance of these possible causes together with administration of alkali may save a fair percentage of the unfortunate children. The author has introduced a regime in Eastern Nigeria which includes daily antimalarials and daily administration of alkali. The pain of sickle-cell crises is treated with pethidine and vasodilators. Hot water bottles can be helpful. *H. Lehmann*

ALLEYNE, G. A. O. & WENT, L. N. **Sickling and Haematuria. A Preliminary Report.** *West Indian Med. J.* 1959, Sept., v. 8, No. 3, 171–8. [18 refs.]

Clinical and laboratory data are tabulated for 17 Jamaican patients, all sicklers, who had had haematuria without assignable cause except for the sickling. Their genotypes were AS 13 cases, SC 1 case, SS 1 case, undetermined 2 cases. Previous reports on 68 similiar patients are tabulated; they were all sicklers except for 1 of genotype AC.

The authors do not think the association is a chance one, and they point out that since the majority of patients are adult, the haematuria must depend upon some cumulative effect of the property of sickling upon the kidney [compare with a similar conclusion for hyposthenuria, SCHLITT and KEITEL, this *Bulletin*, 1960, v. 57, 1304]. The haematuria is not the result of urinary infection, and cystoscopy shows that the blood may come from either kidney, or both.

Alan B. Raper

BERNSTEIN, J. & WHITTEN, C. F. **A Histologic Appraisal of the Kidney in Sickle Cell Anemia.** *Arch. Pathology.* 1960, Oct., v. 70, No. 4, 407–18, 11 figs. [20 refs.]

It is recognized that in children with sickle-cell anaemia, renal complications occur as follows: (a) nearly all have a concentration defect [this *Bulletin*, 1956, v. 53, 1376; 1957, v. 54, 80; 1960, v. 57, 1304], (b) many children have an increased glomerular filtration rate (GFR), (c) haematuria sometimes occurs, and (d) renal failure is a rare event.

The authors reviewed the histopathological features of the kidneys of children with sickle-cell anaemia, aged 1–15 years, dying at the Children's Hospital of Michigan, Detroit, in 1950–59. In those under 2 years of age the kidneys were normal, but congested. Over this age, the juxta-medullary glomeruli were larger than in controls, accounting for the increased GFR; and the pyramids showed telangiectasia, fibrous scars, and obliteration of tubules. In the older children there was in addition glomerular fibrosis, 2 children (aged 15 and 10) showing glomerular crescents, sclerosis, and tubular dilatation. *Alan B. Raper*

GILLARD, A. Contribution à l'étude des manifestations cliniques de l'anémie drépranocytaire: quelques pièges chirurgicaux. **[Clinical Manifestations of Sickle-Cell Anaemia. Some Surgical Pit-falls]** *Ann. Soc. Belge de Méd. Trop.* 1960, Apr. 30, v. 40, No. 2, 339–48, 2 figs. on pl. [11 refs.]

If the condition of sickle-cell anaemia is kept in mind by the clinician when examining African patients, then the so-called pseudo-surgical manifestations of a sickle-cell crisis are readily distinguishable from true surgical conditions requiring early intervention by operation. This is especially the case in dealing with the acute abdomen in small children when a sudden onset of paralytic ileus with a painful, tender and distended abdomen may well be thought to be due to intussusception unless the child is fully examined and a sickle-cell crisis excluded. It is not enough to rely on the presence of pallor, icteric tinge or a changed white cell count, but a complete blood examination must be made. If this shows there has been a sickle-cell crisis it is clear that operation must be delayed. In such a case the acute signs and symptoms nearly always subside gradually.

It is important to remember sickle-cell anaemia also in examining older children and adolescents with certain joint and bone affections. The blood crises may lead to many changes that simulate surgical conditions of bones and joints. In particular, a painful hip or painful and swollen knee may be thought to be Perthes' disease or an internal derangement of knee until a full blood examination and X-ray examination of the skeleton show the true cause of the changes causing the trouble.

Four illustrative case histories are given.

[In Sierra Leone it has been found that over 50% of the children in the Mende tribe have the sickle-cell trait and there is a heavy infantile mortality from the acute blood crises. It was not difficult, however, in that country to distinguish clinically between the true surgical acute abdomen and that due to a blood crisis.] *J. R. Rose*

RAPER, A. B., GAMMACK, D. B., HUEHNS, E. R. & SHOOTER, E. M. **Four Haemoglobins in One Individual. A Study of the Genetic Interaction of Hb-G and Hb-C.** *Brit. Med. J.* 1960, Oct. 29, 1257–61, 1 text fig. & 6 figs. on pl. [27 refs.]

In the last few years it has become recognized that the haemoglobin molecule consists of 4 haems and 4 peptide chains. The peptide chains are arranged in 2 subunits: 2 chains with the terminal amino-acids, valine and leucine, are designated as α-chains, and two chains with the terminal amino-acids, valine, histidine and leucine, have been designated β-chains. The formula of an adult haemoglobin is therefore $\alpha_2\beta_2$. In sickle-cell haemoglobin an amino-acid substitution is found in the β-chains and the same applies to haemoglobin C. Their formula is therefore respectively $\alpha_2\beta_2^S$ and $\alpha_2\beta_2^C$. Other haemoglobins may have substitution in the α-chains and such a haemoglobin, $\alpha_2^G\beta_2$ is present in the family in this paper.

This study took its origin from the discovery of 4 adult haemoglobins in one person. The family study showed the same finding in one parent and one offspring, 3 of these haemoglobins were haemoglobins A, G and C and the fourth could, by hybridization experiments, be shown to consist of the abnormal α-chains of haemoglobin G and the abnormal β-chains of haemoglobin C.

The work presents strong evidence in the favour of the theory that the α-chains and β-chains are controlled by different genes. Hence, the inheritance of haemoglobin G ($\alpha_2^G\beta_2$) and haemoglobin C ($\alpha_2\beta_2^C$) would allow for the combinations $\alpha_2\beta_2$ (haemoglobin A), $\alpha_2^G\beta_2$ (haemoglobin G), $\alpha_2\beta_2^C$ (haemoglobin C) and lastly, and this is the most important part of the study, the *in vivo* formation of the doubly abnormal hybrid $\alpha_2^G\beta_2^C$. *H. Lehmann*

HUEHNS, E. R., FLYNN, F. V., BUTLER, Elizabeth A. & SHOOTER, E. M. **The Occurrence of Haemoglobin 'Bart's' in conjunction with Haemoglobin H.** *Brit. J. Haematol.* Oxford. 1960, Oct., v. 6, No. 4, 388–94, 3 figs. (2 on 2 pls.) [27 refs.]

"A Starch-gel electrophoretic technique has been developed which can achieve separation of Hb–A, Hb–Bart's and Hb–H and detect Hb–H at only 0·1 per cent of total haemoglobin concentration.

"Using this technique Hb–Bart's has been found to occur in association with Hb–H in two previously reported cases of Hb–H disease occurring in two separate families.

"The implications of these findings are discussed and the theory is advanced that Hb–H disease results from the interaction of two genes for α-thalassaemia which markedly reduce the rate of synthesis of α-polypeptide chains."

[See this *Bulletin*, 1958, v. 55, 936; 1959, v. 56, 353.]

LIE-INJO LUAN ENG & JO BWAN HIE. **Hydrops Foetalis with a Fast-Moving Haemoglobin.** *Brit. Med. J.* 1960, Dec. 3, 1649–50, 2 figs.

During a study in Djakarta of haemoglobin in premature and stillborn infants, the authors saw a premature infant with symptoms of hydrops foetalis, with

hepato-splenomegaly and anaemia. The full history of the case and of the parents is given together with the investigations made.

Paper electrophoresis of the cord blood showed the presence of two haemoglobin spots; one had the mobility of haemoglobin A and F while the other was faster than A but slower than H. It had the same mobility as the haemoglobin described by FESSAS and PAPASPYROU [this *Bulletin*, 1958, v. 55, 444]. The child died soon after birth, but the blood picture in the capillaries of the foetal placenta indicated severe erythroblastosis. There were no significant haematological findings in the parents.

It seems possible that the condition seen in the infant was not caused by incompatibility with the mother's blood but by a faulty haemoglobin metabolism. If this is correct, a new aspect of hydrops and erythroblastosis foetalis is suggested.

In an addendum the authors state that they have since been able to show that the fast-moving haemoglobin found had the same mobility as " Bart's " haemoglobin (now believed to be identical with the Fessas and Papaspyrou type—*—Brit. Med. J.*, 1959, v. 2, 886). The authors also state that they have since seen 3 similar cases, 2 of them in twins: the greatest part of the fast-moving pigment in these cases was " Bart's " haemoglobin and also a small amount of haemoglobin H was present. *H. J. O'D. Burke-Gaffney*

BETKE, K., GRÖSCHNER, E. & BOCK, K. **Properties of a Further Variant of Haemoglobin M.** [Correspondence.] *Nature*. 1960, Dec. 3, v. 188, 864–5, 2 figs.

FEHR, H. U. & MIESCHER, P. Ferrokinetische Studien bei Patienten mit Thalassaemia minor. [**Kinetic Studies of the Iron Metabolism in Patients with Thalassaemia Minor**] *Schweiz. med. Woch.* 1960, Oct. 22, v. 90, No. 43, 1218–20, 3 figs. [10 refs.]

In a Swiss family of middle and southern German origin, 5 members were shown to possess the thalassaemia gene. On the injection of radio-active iron in 2 patients, it was found that the iron turnover was increased, though the incorporation of iron into the red cells was normal, or slightly decreased. Red cell survival time was diminished in one of the patients examined.

Thalassaemia differs from hereditary sidero-achrestic anaemia, in which there is also a difficulty in incorporating iron into the haemoglobin. In the second condition far more iron is utilized, although it is not incorporated into the haemoglobin, and is found in the bone marrow in the form of coarse iron granules; these are also seen, together with an increase of coproporphyrin, in the red cells. *H. Lehmann*

VENOMS AND ANTIVENENES

WIG, K. L. & VAISH, S. K. **Snake Bite and its Treatment.** *J. Indian Med. Ass.* 1960, Oct. 1, v. 35, No. 7, 307–11.

In India it is estimated that 20,000–25,000 persons die each year of snake bite. The species responsible for most of these deaths are the elapine snakes, the cobra and krait, and the viperines, Russell's viper and the saw-scaled viper, *Echis carinatus*. Attacks on man are most frequent in the hot weather, and during the summer of 1959 in Delhi, 13 patients suffering from snake bite were treated at the Safdarjang Hospital.

Of the 13 patients, 4 had mild local symptoms including pain, swelling and some bleeding from the puncture site, with little or no constitutional disturbance: it was probable that these had been bitten by viperine species but had sustained minimal envenomation. Symptoms and signs in those more severely affected included giddiness, vomiting, bleeding from the wound, gums, lungs and urinary tract, with much local swelling and extravasation of blood. [The occurrence of tissue necrosis is not recorded.] Slight increase in the bleeding time was observed in 4 out of 12 patients, the coagulation time was markedly prolonged in these same patients (to 1 hour 20 minutes) and their prothrombin time was greatly increased.

Treatment was initiated in the casualty department with an intravenous injection of 10–20 ml. of a bivalent antitoxic serum prepared at the Kasauli Research Institute against cobra and Russell's viper venom. A tourniquet was applied, where practicable, in the case of patients who were received early, and incisions were made into the fang punctures. The wound was then washed with potassium permanganate solution. On admission to the wards, if general symptoms persisted, a further 20 ml. of antivenene were injected intravenously. Penicillin and streptomycin were also injected. Every patient in this series was given steroids, either as cortisone 100–200 mgm. daily or prednisolone 30–40 mgm. daily. Several patients lost so much blood from the wound, and one bled so seriously from the urinary tract and another from the lungs in addition, that blood transfusion was required. Analgesics were also given.

2 patients brought with them the snakes which had bitten them; in each case these were identified as *Echis carinatus*.

All the patients recovered.

The authors stress that this is an initial report on the use of a combination of antivenene and steroids, and hope that others will investigate the effect of this therapy. They suppose that the hormone protects the capillary endothelium and helps to avert circulatory collapse [see also this *Bulletin*, 1954, v. 51, 101].

J. H. Walters

PARRISH, H. M., BADGLEY, R. F. & CARR, Carole A. **Poisonous Snake Bites in New England.** *New England J. of Med.* 1960, Oct. 20, v. 263, No. 16, 788–93, 3 figs. [39 refs.]

There have been few recent reports of poisonous snake bites in New England, though there these reptiles are indigenous. Out of 71 deaths from snake venom

in the U.S.A. from 1950 to 1954 none was reported from the New England States. There are no reliable statistics on the incidence of poisonous snake bites in the U.S.A. HUTCHISON (*Bull Antivenin Inst. Amer.*, 1929, v. 3, 43) described 607 case reports of snake venom poisoning in 1928 and 482 in 1929 (*ibid.*, 1930, v. 4, 40). In Florida, PARRISH [this *Bulletin*, 1958, v. 55, 313] from information provided by hospitals and practising physicians, reported an average of 120 persons bitten in that State each year. The purpose of this study is to determine more accurately the incidence of poisonous snake bites in the New England States and to study epidemiological and clinical factors.

Approximately 15 species or subspecies are indigenous in New England and of these only 2 are poisonous—the northern copperhead (*Ancistrodon contortrix mokeson*) and the timber rattlesnake (*Crotalus horridus horridus*). Both are pit vipers, identified by a deep pit located between the eye and nostril, by elliptical pupils and 2 well-developed fangs that protrude from the maxillae when the mouth is opened. The timber rattlesnake has characteristic rattles attached to its tail. The northern copperhead has no rattles, but a reddish-brown head and dark crossbands on the body like hour-glasses. Harmless snakes do not possess facial pits; they have round pupils' teeth, but no fangs.

Details are given of the incidence of rattlesnakes in different New England States. The northern copperhead is found in Massachusetts, Connecticut and Rhode Island.

Information was collected by a questionnaire sent to 311 hospitals and college infirmaries and to selected physicians in the New England area.

Bites were classified as follows:—

Grade 0—*no venenation*. Fang or tooth marks, minimal pain, less than 2·5 cm. of surrounding oedema and erythema.

Grade I—*minimal venenation*. Moderate pain and 2·5–12·7 cm. of surrounding oedema and erythema in the first 12 hours after the bite.

Grade II—*moderate venenation*. Severe pain and 15–30 cm. of surrounding oedema with systemic involvement shock or neurotoxic symptoms.

Grade III—*severe venenation*. Severe pain and more than 30 cm. of surrounding oedema in the first 12 hours with systemic involvement.

In the questionnaire many physicians commented that they had never treated a poisonous snake bite. 8 harmless snake bites were reported by physicians in New Hampshire and Vermont. During the 2-year period 1957–1958, 12 cases of poisonous snake bite were reported.

Few occur during the winter months as snakes are hibernating. Most happen between April and October. As regards time of day, there were 5 in the morning, the same number in the afternoon and 2 between 6 and 8 p.m. A few copperhead bites are inflicted at night.

The majority of cases were in children and young adults who know little about the potential dangers. Of the 12 victims, 11 were males and all were white. 8 bites were on the upper and 4 on the lower extremities. 2 were Grade 0, 7 Grade I, 1 Grade II and 2 Grade III. Most of the snake bites were inflicted by copperheads; although the venom is poisonous they do not produce a large amount.

Antivenene was withheld in subjects with Grade 0 bites, especially in a boy with asthma, who gave a positive skin test for horse-serum allergy. It is not recommended in this Grade.

In Grade I the use of tourniquet, incision, suction and (in a case cited) 10 ml.

of antivenene are indicated. Hospital observation for 24 hours is also recommended. Cortisone and corticotrophin do not seem to influence the case fatality rate.

In Grade II shock is common and is effectively treated with intravenous infusion of whole blood, plasma, saline solution and vasopressor drugs. Tourniquet with incision and suction is more effective while the venom is localized to a small area. Three case histories are given to illustrate these grades.

Case 4 is cited as a good subjective account of Grade III venenation. This occurred in an experienced snake collector who slipped and fell among 3 rattlesnakes on a mountain side and was bitten high on the right forearm. The pain was very severe. He applied first-aid from his snake kit by incision and suction (by means of suction cups). After half an hour the effects of shock were becoming evident. The swelling and discoloration lasted 1 week.

Philip Manson-Bahr

WIENER, S. **Active Immunization of Man against the Venom of the Australian Tiger Snake** (*Notechis scutatus*). *Amer. J. Trop. Med. & Hyg.* 1960, May, v. 9, No. 3, 284–92. [20 refs.]

The subject was a man who was a frequent handler of snakes and in pursuit of such activities had been bitten several times by various snakes. As a result of treatment for these bites with antivenene, prepared in horses, he had acquired sensitivity to horse serum. As the man wished to continue his study of snakes active immunization against the venom of the tiger snake was undertaken at his own request.

With the use of a semi-purified venom, immunization was started with a subcutaneous injection of 0·002 mgm. and gradually increasing doses at weekly intervals for some months; later the intervals were lengthened. Immunization continued for 13 months when the final dose of the venom was 25 mgm. Depending on the interval of time between the injections the serum levels of antivenene fluctuated between 1·5 and 5·2 units/ml. and 4 months after the final dose of venom the titre was 2 units per ml. It is considered that a titre of 1 unit per ml. constitutes a protective level in an adult against the bite of tiger snake containing an average amount of venom.

It may be concluded from this account that active immunization was successful in that it resulted in the development of a protective level of antivenene in the blood serum which persisted for at least 4 months. Without further evidence it cannot be assumed that this protective level would be long lasting; is is unfortunate that the blood serum levels were not estimated over a longer period.

The snake-bite history of the man in question is probably not complete, for according to the table given each time he had been bitten by *Notechis scutatus* he had been treated with antivenene, yet his pre-immunization level of tiger snake antivenene was found to be 0·2 unit per ml. blood serum. It will be recalled that PARRISH and POLLARD [this *Bulletin*, 1959, v. 56, 879] found no evidence of residual immunity in 12 persons who had been repeatedly bitten by pit-vipers.

H. J. Bensted

PRINGLE, G. **Notes on the Scorpions of Iraq.** *Bull. Endem. Dis.* Baghdad. 1960, July, v. 3, Nos. 3/4, 73–87, 10 figs.

VACHON, M. Quelques remarques sur *Apistobuthus pterygocercus* Finnegan, Scorpion (Buthidae) habitant l'Arabie. [**Observations on the Scorpion, *Apistobuthus pterygocercus* from Arabia**] *Arch. Inst. Pasteur d'Algérie*. 1960, Sept., v. 38, No. 3, 399–405, 6 figs.

TULGA, T. **Cross-Reactions between Anti-Scorpion (*Buthus quinquestriatus*) and Anti-Scorpion (*Prionurus crassicauda*) Sera.** *Türk Ijiyen ve Tecrübî Biyoloji Dergisi*. Ankara. 1960, v. 20, No. 2, 201–3. [15 refs.] [Fuller version in Turkish 191–200, 1 fig.]

ABUL-FADL, M. A. M. **Biochemical and Immunological Studies on the Toxins of certain Egyptian Scorpions.** *J. Egyptian Med. Ass.* 1960, v. 43, No. 5, 336–57, 10 figs. (2 on 2 pls.) [11 refs.]

Although 14 species of scorpions have been identified as occurring in Egypt, the present study is concerned with 8 species collected from areas between Cairo and Upper Egypt in the main, but the Delta and Lower Egypt also contributed. Nearly 80% of Egyptian scorpions are *Buthus quinquestriatus*; these are large scorpions and the most poisonous. They are particularly common in Upper Egypt and the Egyptian Sudan where they are responsible for a high mortality among young children.

This paper is chiefly concerned with the technical details involved in the preparation of the specific antitoxic serum and much of it is of a biochemical nature, dealing with the purification of the toxin, but the toxicity and antigenicity of the different preparations are also described. The crude fresh venom obtained from living scorpions is the most antigenic and the purified toxin the least. Antitoxic serum, prepared in the goat against *B. quinquestriatus* crude toxin, in doses of 1 ml. neutralized 7 LD50 venom when tested in guineapigs; cross-immunity with other species appears to be limited.

[It is of interest to recall that anti-scorpion serum has been in use in Egypt for more than 50 years and has proved to be a valuable remedy. For many years it was prepared in England by the Lister Institute which had a close connexion with the Egyptian Public Health Department through the late Charles TODD when he moved from the former institute to become Director of the Central Public Health Laboratory, Cairo. In more recent years, of course, all work of this nature has been undertaken in the Serum Institute at Agouza, Cairo.] *H. J. Bensted*

BÜCHERL, W. Loxosceles y loxoscelismo en América del Sur. III. *Loxosceles laeta* (Nicolet) 1849 no existe. [**Loxosceles and Loxosceles Poisoning in South America. III. *Loxosceles laeta* (Nicolet) 1849 does not exist**] *Bol. Chileno de Parasit.* 1960, Oct.–Dec., v. 15, No. 4, 73–7. [12 refs.]

The English summary appended to the paper is as follows:—

"After revising Nicolet's original descriptions and having examined several dozen specimens of *Loxosceles* from Chile, it was concluded that:

"(1) Arachnologists had misinterpreted Nicolet's statements.

"(2) The species hitherto considered as *Loxosceles laeta* must from now on be referred to as *Scytodes laeta* Nicolet 1849.

"(3) The spider which causes Loxosceles poisoning ('Loxoscelism') in Chile is *Loxosceles rufipes* (Lucas) 1834."

TOXOPLASMOSIS

GENZ, Herbert. **Die Sozialhygienische Bedeutung der Toxoplasmose.** [The Importance of Toxoplasmosis in Social Hygiene] pp. vi + 136, 18 figs. 1960. Stuttgart-N: Georg Thieme Verlag, Herdweg 63, Germany. [DM. 13.–.]

From a personal knowledge of 74 cases of toxoplasmosis Dr. Genz sets out to appraise the importance of this disease in West Berlin, and his conclusions are the same as might be drawn from any city where similar observations have been made. Short sections of his monograph on laboratory diagnosis, animal infection and the spread of infection precede the presentation of a large number of short case reports. Signs and symptoms are described, with special emphasis on the congenital forms of toxoplasmosis. The risks run by people engaged in the clinical care or laboratory diagnosis of toxoplasmosis patients are fully discussed, and throughout the author is at pains to stress the importance of animals as a source of human infection.

Having presented and digested his data he reaches certain definite conclusions which will be of general interest and find general approval. Although in the clinic where he works congenital toxoplasmosis is now three times commoner than congenital syphilis the paediatricians are slow to suspect the condition, which is usually established at autopsy. The immediate mortality is high and the later results, such as blindness, deafness and mental deficiency, most serious. So important is the disease that the blood of mothers-to-be should be examined for toxoplasmosis as well as syphilis at the time the blood groups are established. At present the major precaution which can be taken is the avoidance of close contact with animals, regarded as the main reservoir of infection. As at least 31 cases of accidental infection in laboratory workers are known, the greatest care should be exercised by those at risk. Veterinarians should be more alert to the possibility of toxoplasmosis in animals so that the potential danger to man may be diminished. Lastly, Dr. Genz pleads again for more readiness to suspect the condition in both infants and adults, and stresses to family and public health doctor the vital necessity for being alert to the fact that, whether infection is accompanied by clinical manifestations or not, this condition occurs commonly.

[The monograph is well produced but the German sentences take a good deal of working out.] *I. A. B. Cathie*

ANGELILLO, B. & MANDRAS, A. La reazione di emoagglutinazione nella diagnosi di toxoplasmosi. [**The Haemagglutination Reaction in the Diagnosis of Toxoplasmosis**] *Parassitologia*. Rome. 1960, Apr.–Aug., v. 2, Nos. 1/2, 1–2. English summary (5 lines).

In 1957 JACOBS and LUNDE described a haemagglutination test for toxoplasmosis [this *Bulletin*, 1957, v. 54, 1463, 1464].

The present authors, from the Institute of Microbiology, University of Sassari, Sardinia, have compared a similar test with the dye test and complement-fixation reaction in healthy persons and in patients with toxoplasmosis. The preparation of reagents is described briefly. The tests were read after 18 hours' incubation at 4°C.

Among 75 healthy persons the haemagglutination test was positive in 5 and the dye and complement-fixation tests in 3. Among 55 patients suffering from toxoplasmosis the respective figures were 49, 48 and 46, described respectively as 89%, 87·2% and 83·8%.

Since the results with all these tests were so similar the authors conclude that the haemagglutination test is a practical and useful diagnostic method in toxoplasmosis. *H. J. O'D. Burke-Gaffney*

EL MASRI, A., RIFAAT, M. A. & NAGATY, H. F. **Toxoplasmosis as a Probable Cause of Posterior Uveal Affection in Egypt.** *Bull. Ophthalm. Soc. Egypt.* 1959, v. 52, 103–11. [17 refs.]

"1. 3 cases of uveal tract affection diagnosed as due to toxoplasmosis by the toxoplasmin skin test are reported among 7 cases.

"2. The possibility that the disease is a common etiological factor in such cases among Egyptians, is high."

RIEGER, H. Zur Frage der Toxoplasmosebehandlung. [**Observations on the Treatment of Toxoplasmosis**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1960, v. 11, No. 3, 298–305. [Numerous refs.]

The English summary appended to the paper is as follows:—

"Considering the therapeutic activities of sulfonamides, Daraprim, and antibiotics against experimental toxoplasmosis in test animals, the efficacy of these drugs in treatment of human cases of toxoplasmosis has been evaluated by reviewing the pertaining literature and assessing their curative effects in a number of toxoplasmosis cases.

"During the antitoxoplasmic treatment special attention was paid to changes of the titers in the dye test (Sabin & Feldman) and their clinical implications. In 10 positive cases of toxoplasmosis treated with Erycin the results were sufficiently promising to recommend further clinical tests of Erycin as an antitoxoplasmic substance."

DERMATOLOGY AND FUNGUS DISEASES

FUENTES, C. A. & BOSCH, Zilia E. **Biochemical Differentiation of the Etiologic Agents of Chromoblastomycosis from Non-Pathogenic *Cladosporium* Species.** *J. Investigative Dermat.* 1960, June, v. 34, No. 6, 419–21.

The authors compared the biochemical activity of 106 strains of dematiaceous fungi derived from 14 different countries with 71 strains of saprophytic dematiaceous fungi, including 30 strains isolated from the air.

This work was carried out by them in the hope of finding biochemical criteria for distinguishing pathogenic strains from saprophytic strains which otherwise appear morphologically similar.

Results showed that, with only one exception, the pathogenic strains were unable to utilize the culture media presented to them, whereas the saprophytic strains were able to do so, although they showed considerable differences in the time which they required to accomplish this. Thus, *Cladosporium langeronii*, *C. fontoynontii* and *C. olivaceum* "liquefied Loeffler's serum and milk within 5 to 6 days" except for one strain. This strain had been isolated from a case of chromoblastomycosis.

The authors conclude from the results of their work that these differences in biochemical behaviour might have taxonomic value. *C. J. La Touche*

ROTBERG, A. Blastomicose Sul-Americana gomosa micetomatoide. [**South American Blastomycosis resembling Mycetoma**] *Rev. Asoc. Med. Argentina.* 1960, May, v. 74, No. 5, 344–5, 3 figs.

The English summary appended to the paper is as follows:—

"The author reports an apparently non-described form of South-American blastomycosis, with cutaneous and osteo-articular lesions limited to one foot, whose clinical characteristics pointed toward a diagnosis of maduromycotic mycetoma podalis of at least 3 years' duration. No grains were found, however, in the secretion of the numerous fistulae, but a large quantity of spores of 'Paracoccidioides brasiliensis'."

REAMS, G. B. **Coexistent Pulmonary Coccidioidomycosis and Tuberculosis.** *Lancet.* 1960, Dec. 10, 1281–2, 4 figs. [31 refs.]

"A young white man without symptoms was found to have a right upper lobe pulmonary infiltration which could not be definitively diagnosed on the basis of skin tests, sputum studies, bronchoscopy, or supraclavicular fat-pad biopsy. A segmental resection revealed the lesion to be the effect of coexistent coccidioidomycosis and active pulmonary tuberculosis.

"This is thought to be the first reported instance of this combination in England."

PAPPAGIANIS, D., MILLER, R. L., SMITH, C. E. & KOBAYASHI, G. S. **Response of Monkeys to Respiratory Challenge following Subcutaneous Inoculation with *Coccidioides immitis*.** *Amer. Rev. Respiratory Dis.* 1960, Aug., v. 82, No. 2, 244–50, 3 pls.

On the basis that subcutaneous inoculation of mice with *Coccidioides immitis* resulted in localized lesions, and that these mice appeared subsequently to show

increased resistance to intraperitoneal or intranasal challenge (*J. Invest. Dermat.*, 1959, v. 32, 589) the authors carried out a series of inoculations in monkeys to confirm these apparent results.

7 monkeys (*Macacus irus*) were used for this series while 4 of the same species served as controls.

Results showed on X-ray examination, "massive fluffy infiltrates with widespread diffuse nodular densities" in the lung fields of the controls, whereas no abnormalities were observable in the lung fields of the monkeys which had been inoculated subcutaneously previous to systemic intranasal challenge. Moreover, while all the control monkeys were cachectic at the time when they were killed, 4 of the experimental monkeys were strong at this time. These results were, moreover, reflected in the serum titres in the 2 groups, in so far as the serum titres of the control monkeys, which had not been inoculated subcutaneously prior to systemic intranasal challenge were much lower than those of the monkeys which had been thus inoculated. *C. J. La Touche*

TROPICAL OPHTHALMOLOGY

HOLMES, William John [M.D.]. [Edited by.] **Geographic Ophthalmology. Asia, Australia, and Africa.** pp. xv + 293, numerous figs. 1959. Springfield: Charles C. Thomas, Bannerstone House, 301–327, East Lawrence Avenue, Ill., U.S.A. [63s.]

This book consists of 20 essays written by 21 experts on different aspects of tropical and general ophthalmology. There is no suggestion that the Editor has welded them together in accordance with a master plan. Some of the sections are good, others indifferent. None of the bibliographies which are provided at the end of each section contain references subsequent to 1956 or 1957.

One of the best sections is that of "Leprosy of the Eye" by the Editor, Dr. Holmes, which is, however, reprinted in full from the *Transactions of the American Ophthalmological Society*, 1957.

Onchocerciasis is inadequately covered by one brief paper by F. H. BUDDEN reprinted *in toto* from the *British Journal of Ophthalmology* [this *Bulletin*, 1957, v. 54, 1007]; this paper does not attempt to deal comprehensively with the whole subject of onchocerciasis and of course is substantially out of date. The section on trachoma (M. A. SHAH; T. DAS, M. S. NIRANKARI & M. R. CHADDAH) is also too brief; there is no reference, for example, to the work of T'ANG in China and COLLIER *et al.* in London [*ibid.*, 1959, v. 56, 95] on the isolation of the trachoma virus and its successful passage and recovery from human volunteers and of the immunological implications of this piece of research. Surprisingly enough, there is no section on the surgical treatment of the late results of trachoma which cause a large amount of ocular morbidity at the present day and for the relief of which many different operations have been devised. In such a book one would expect to find a description and critical account of the relative merits of these different types of operation. Xerophthalmia and keratomalacia are described by V. RANGACHARI, but no reference is made to other eye conditions caused by food deficiencies and intoxications.

The Editor has selected some unusual surgical items for inclusion in his book. A chapter headed "Westernizing the Oriental Eye" by B. T. SAYOC is a fascinating account of how to provide palpebral folds to Orientals born without them. Cataract surgery is discussed by M. S. NIRANKARI and M. C. MAUDGAL and a separate chapter by R. CHING discusses it as an office procedure. The sections on cataract contain no reference to enzymatic zonulolysis or the use of the erisiphake, the former of which has indisputably altered the whole conception of cataract surgery at the present day. Probably the best of the surgical sections are on the treatment of pterygium by T. BOYD LAW and W. L. GIBSON and orbital rodent ulcers by P. B. ENGLISH. There is a section on anterior chamber surgery and half-corneal incisions by Tutomu SATO. The reviewer considers that the wholesale use of Sato's corneal incisions, which are designed to reduce the optical defect of myopia by producing a controlled scarring of the cornea, might increase rather than diminish the incidence of blindness and he cannot recommend them.

The book as a whole, which includes several other papers, is interesting to those of us who are familiar with the problems it covers but in the opinion of the reviewer it does not wholly fulfil the implications of its title. *D. P. Choyce*

VANCEA, P. & CERNEA, P. L'évolution du trachome en 40 ans (1919–1959) à la clinique ophtalmologique d'Jassy. [**Developments in Trachoma in 40 Years at the Ophthalmological Clinic at Jassy**] *Rev. Internat. du Trachome.* 1960, v. 37, No. 4, 614–20. [10 refs.]

LÉPINE, P. **Recent Research on the Trachoma Virus.** *Rev. Internat. du Trachome.* 1960, v. 37, No. 4, 562–73. [77 refs.] [French version 549–61.]

HARISIJADES, S. S. & STAMENKOVIC, K. **Isolation of Trachoma Virus from a Patient in Yugoslavia. A Preliminary Report.** *Acta Med. Iugoslavica.* 1960, v. 14, No. 2, 221–3.

The authors, in the Institute of Microbiology, Medical Faculty, University of Belgrade and Anti-Trachomatous Dispensary, Tuzla, during the course of studies on trachoma in Bosnia, isolated the virus from a boy of 14 with clinical trachoma. Despite 2 days' treatment with aureomycin ointment up to the day before the material was taken, inclusion bodies were found in smears from the boy's conjunctiva.

Scrapings were taken in broth-saline with 250 μgm./ml. of streptomycin and inoculated into yolk sacs of 2 embryos aged 5 and 6 days: for inoculation, a further 200 μgm./egg streptomycin were added. One embryo died on the 4th day, but the second, killed on the 10th day, showed a few elementary bodies in the yolk sac. 4 embryos were inoculated in the second passage and elementary bodies were found in considerable number in 2 of them after 10 days' incubation. Thereafter 1000 μgm./ml. of polymyxin B and 100 units/ml. of bacitracin were added to control (successfully) bacterial contamination which had arisen.

From the 3rd passage, embryos died on the 8th to 10th days and elementary bodies were readily detected in the smears of yolk sacs. These were morphologically identical with those described by T'ANG *et al.* [this *Bulletin*, 1958, v. 55,

96]. A 20% yolk sac suspension from the 5th passage produced follicles in the fornix of a monkey (*Papio anubis*) 8 days after inoculation of its tarsal conjunctiva, and typical inclusion bodies were obtained from scrapings of the affected conjunctiva. Normal yolk sac suspension rubbed on the conjunctiva of the opposite eye produced no effect. The monkey material was cultivated in embryonated eggs and elementary bodies were again recovered. Acute trachoma was also induced in one of the authors with a 25% yolk sac suspension from the 8th passage and the virus was re-isolated from his affected eye.

H. J. O'D. Burke-Gaffney

See also p. 325, McLean, **Ocular Leprosy and Trachoma in a Leprosarium.**

See also p. 374, El Masri *et al.*, **Toxoplasmosis as a Probable Cause of Posterior Uveal Affection in Egypt.**

MISCELLANEOUS DISEASES

Morley, D. C. **Cold Injury among Children Severely Ill in the Tropics.** *Lancet*. 1960, Nov. 26, 1170–71.

The one thing one does not expect to worry about in the tropics is the danger of cold. Yet the authors point out that in Ilesha, Western Nigeria, where the mean maximum temperature fluctuates between 82°F. and 94°F., and the mean minimum between 68°F. and 74°F., there is sufficient cold to allow a severe drop in temperature in sick children. A temperature below 95°F. [presumably rectal] occurred in 19 children in 3 months, and of these no less than 9 died. The main illnesses precipitating the failure of temperature regulations were kwashiorkor (8 cases) and diarrhoea (5 cases); the main symptoms were lethargy and a slow pulse rate. The children were aged up to 8 years. The authors suggest that the most effective method of warming the children was to allow their mothers to sleep with them. 3 short case histories are given.

[In contradistinction to cases of cold injury described in infants in temperate climates, these were in older children suffering from diseases severe and debilitating in themselves. While it may be thought that the low temperatures were a direct result of the illnesses, nevertheless the need for symptomatic treatment is rightly emphasized.] *A. C. E. Cole*

Somers, K. **Hypertension and its Management in an African Hospital in Uganda.** *J. Trop. Med. & Hyg.* 1960, Nov., v. 63, No. 11, 260–64.

"Data on 82 patients with hypertension treated at a hypertension clinic in a tropical African hospital are presented. The problems of management are discussed. These problems are likely to be common to developing countries in

Africa and elsewhere. The simple régime devised can be recommended in the setting up of clinics for the treatment of hypertension at other centres."

Touze, M. E. Ulcères gastro-duodénaux en Afrique Equatoriale (à propos de 110 cas opérés). Plaidoyer en faveur de la gastrectomie. [**Peptic Ulcers in Equatorial Africa. An Account of 110 Operation Cases**] *Méd. Afrique Noire*. Dakar. 1960, Oct. 1–15, v. 7, No. 19, 381–2.

See also this *Bulletin*, 1959, v. 56, 1062 ; 1960, v. 57, 182, 644.

McCutcheon, A. D. **Drug-Induced Haemolytic Anaemia and Favism.** *Med. J. Australia*. 1960, Oct. 8, v. 2, No. 15, 561–4, 3 figs. (2 on pl.). [21 refs.]

"1. The application and significance of tests for the detection of deficiency of the enzyme glucose-6-phosphate dehydrogenase in drug-induced haemolytic anaemias are discussed.

"2. A case of favism is presented, in which there occurred a positive response to the Heinz body incubation test, an abnormal response to the glutathione stability test, and a deficiency of G6PD activity.

"3. Five cases of drug-induced haemolytic anaemia in Western European type people, found to give normal results to Heinz body and glutathione stability tests, are presented. The mechanism of anaemia in these cases is discussed.

"4. With the continued influx of migrants from the Mediterranean region, more cases of favism and drug-induced haemolytic anaemia due to deficiency of glucose-6-phosphate dehydrogenase will be seen. Diagnosis of the specific defect is important in preventing further attacks of haemolysis."

Brisou, J., Peloux, Y., Cadeillan, J. & Tysset, C. Bacille de Whitmore et *Flavobacterium* protéolytiques pathogènes. [**Whitmore's Bacillus and Pathogenic, Proteolytic** *Flavobacterium*] *Bull. Soc. Path. Exot.* 1960, May–June, v. 53, No. 3, 435–43. [18 refs.]

The purpose of this paper is to discuss the possible relationships between Whitmore's bacillus and certain proteolytic organisms of the genus *Flavobacterium* which are occasionally pathogenic for man and animals.

The position of Whitmore's bacillus in systematic bacteriology has been the subject of much controversy. The 1930 edition of Bergey's *Manual* placed it clearly in the genus *Flavobacterium*. The present edition (1957) places it in the genus *Pseudomonas*, and Chambon and Fournier [this *Bulletin*, 1957, v. 54, 92] have shown antigenic relationships between Whitmore's bacillus and *Pseudomonas aeruginosa* [*pyocyanea*]. The authors of the present paper consider this sharing of antigens to be of minor importance. They have simply compared the biochemical characteristics of 8 strains of Whitmore's bacillus with those of 17 strains of *Flavobacterium*.

They consider that the production by Whitmore's bacillus of a typical water-insoluble carotenoid pigment and its ability to liquefy gelatin and reduce nitrates to nitrites is sufficient to include it in the *Flavobacterium* genus. The clinical

aspects of melioidosis are compared and likened to infections by *Flavobacterium* organisms. None of the strains of *Flavobacterium* studied by the authors were agglutinated by antiserum to Whitmore's bacillus.

They conclude, on the basis of similarity in biochemical behaviour and production of similar symptoms in infection, that Whitmore's bacillus should be called *Flavobacterium pseudomallei* (Whitmore) as originally stated in the 1930 edition of Bergey's *Manual.*

[The authors would appear to have overlooked that Whitmore's bacillus has polar flagella (one of the reasons for its inclusion in the genus *Pseudomonas*) and that the genus *Flavobacterium* is described by Bergey's *Manual* as being motile by peritrichous flagella.] *May F. McCallum*

PARASITOLOGY: GENERAL

NAGATY, H. F. & KHALIL, H. M. **Incidence of Parasitic Infections among the Outpatients attending the Rural Health Unit at Ezbet-El-Burg, Damietta Province, Egypt, U.A.R.** *J. Egyptian Med. Ass.* 1960, v. 43, No. 5, 298–311, 6 figs. [11 refs.]

The observations here recorded were made during the second half of August and the first half of September 1959 in a fishing village situated on the eastern shore of the Damietta branch of the Nile close to its termination in the Mediterranean Sea.

The urine and stools of 368 out-patients attending the Rural Health Unit established in the village were examined for parasites and the results are set out by sex and age-groups in a number of tables and graphs.

The survey showed that despite the efforts made by the Ministry of Public Health schistosomiasis, ankylostomiasis, heterophyiasis and amoebiasis are far from being eradicated. Infection with *Ascaris*, *Trichuris* and *Trichostrongylus* was also present in a fairly high percentage. The incidence of *Heterophyes heterophyes* infection has dropped considerably since 1933 and this is attributed to advances in education and in social conditions. The authors point out that the consumption of improperly cooked and insufficiently salted fish is the main factor favouring the incidence of this infection, and that this could be combated by improvement in education combined with the energetic treatment of infected persons. Urinary schistosomiasis was found in 17% of the population examined and intestinal schistosomiasis in 4·8%. Hookworm infection was comparatively low (8·7%). *G. Covell*

ZELEDÓN, R. **Comparative Physiological Studies on Four Species of Hemoflagellates in Culture. II. Effect of Carbohydrates and Related Substances and Some Amino Compounds on the Respiration.** *J. Parasitology.* 1960, Oct., v. 46, No. 5, 541–51, 6 figs. [30 refs.]

In an earlier paper of this series [this *Bulletin*, 1960, v. 57, 954] the endogenous respiration and respiration in presence of glucose of the same haemoflagellates,

namely *Endotrypanum schaudinni*, *Leishmania enriettii*, *Schizotrypanum vespertilionis* and *Schizotrypanum cruzi*, were measured. In the present study the effect on respiration of certain carbohydrates and related substances and of a few nitrogenous substances has been studied, while endogenous respiration was measured at the same time as control. The results obtained are clearly set out in tables. An interesting observation was the oxidation of 2-desoxyglucose by the two species of *Schizotrypanum*, and the high rates of oxygen uptake by some of these organisms in presence of glutamine. The oxidation of this latter substance and related amino compounds is, in the author's opinion, connected with the presence of active transaminases in the organisms, and probable involvement in the tricarboxylic acid cycle of metabolism. Significant differences were noted among the three genera studied, while there was remarkable similarity in behaviour of the two species of *Schizotrypanum*. The nature of these differences and similarities is described.

J. D. Fulton

ZELEDÓN, R. **Comparative Physiological Studies on Four Species of Hemoflagellates in Culture. III. Effect of the Krebs' Cycle Intermediates on the Respiration.** *Rev. Biologia Trop.* San José, Costa Rica. 1960, July, v. 8, No. 1, 25–33, 3 figs. on pl. [22 refs.]

Evidence for the presence or absence of a tricarboxylic acid (TCA) cycle in trypanosomes has been given by various workers [this *Bulletin*, 1948, v. 45, 495; 1956, v. 53, 729]. The present investigation deals with oxidation of the intermediates of this cycle by the culture forms of the four species of haemoflagellates described in Part II above. [See also *ibid.*, 1960, v. 57, 954.] Manometric measurements were carried out in conventional apparatus in air at 30°C. for 2 hours. In tables are recorded the effect of the above intermediates on respiration at *p*H 7·2 and 5·0, and at the lower *p*H they caused greater stimulation of respiration than glucose. Results suggested that there is a complete or partial TCA cycle of metabolism, functional in the 4 species studied, although stimulation by tricarboxylic acids was in some cases small or absent. Transamination reactions were marked in the 2 species of *Schizotrypanum* studied.

J. D. Fulton

SCHULEMANN, W. & WURMBACH, H. Die Färbung von Protozoen im Schnittpräparat. [**Staining of Protozoa in Histological Sections**] *Riv. di Parassit.* Rome. 1959, Dec., v. 20, No. 4, 379–87, 4 coloured figs. on pl. [19 refs.]

While the Romanovsky-derived methods produce excellent results in dry-fixed preparations of blood and tissues, they are unsuitable for staining blood protozoa in sections of infected tissues. The authors describe a new method, devised by them, in which this defect has been overcome, and the stained parasites (*Plasmodium*, trypanosomes, coccidia, etc.) show the same coloration as they do in dry-fixed smears. The new method also reveals RNA and DNA, as well as other cell constituents.

For staining by the new method the following technique is employed. Small pieces of infected tissue are fixed for 1–4 hours by Susa's method (described in

ROMEIS, *Taschenbuch der mikroskopischen Technik*. 14th ed. 1943. München-Berlin: Oldenburg), after which they are embedded either in Carbowax (Cremolan) or in paraffin wax. After the sections are attached to slides, the wax is dissolved and they are treated with Weigert's iodine followed by sodium thiosulphate, in order to remove the mercury compounds. The sections are then thoroughly washed in distilled water, and placed in a buffer solution to produce *p*H 6·6, after which they are stained in a mixture of 2 stains: (1) *AM*, consisting of Azur I + methylene blue, and (2) *E*, consisting of water-soluble eosin.

The solutions of these stains in buffered water should be mixed just before use, by pouring them *simultaneously* into a flask. The sections are allowed to stain in this mixture for 24 hours, after which they are transferred to a freshly prepared mixture for another 24 hours. Differentiation is carried out in a series of acidified mixtures of dioxane and water, after which the sections are passed through acetone-xylol mixture and xylol, and finally mounted in Caedax.

C. A. Hoare

ROBLEDO, Efigenia, SANTIBÁÑEZ, E., GONZÁLEZ, Clementina & BIAGI, F. Los purgantes en el diagnóstico de las parasitosis intestinales. [**The Use of Purgatives in the Diagnosis of Intestinal Parasites**] *Rev. Latinoamer. Microbiol.* Mexico, 1960, June, v. 3, No. 2, 75–80. English summary (9 lines).

Although purgatives are commonly recommended in taking specimens for the diagnosis of intestinal parasites, there seems to be little evidence in the literature to confirm the validity of their use, though ALICNA and FADELL [this *Bulletin*, 1960, v. 57, 419] found that purgation increased the chances of finding parasites. The present authors, in Mexico, compared the results obtained with and without purgatives in examination of the faeces of 377 children. The purgatives were given the night before the specimens were taken. 36 children received sodium sulphate and 341 castor oil. No differences between these two purgatives were found in the diagnostic results. Faeces were examined by direct smear in 293 children, by concentration in 370 and by culture in 69. From each child 3 normal specimens were taken and a fourth was taken after purgation.

The results are shown in 8 tables for 7 protozoal and 7 helminthic parasites in terms of each of the 4 serial stool specimens and of each of the 3 methods of examination. In some cases, so few parasites were seen that definite conclusions could not be drawn: but those parasites seen most frequently (*e.g. Entamoeba coli, Giardia, Ascaris, Trichuris and Hymenolepis*) were detected more frequently in normal stools than in those taken after purgation, by all 3 methods of examination. This was particularly marked in the case of protozoa: of 478 diagnosed by the 3 methods 53·2% were found in normal stools and only 34% after purgation. All the results were statistically significant. It is suggested that the results are explained by increase in the volume of the faecal mass by purgation so that the number of cysts and eggs per unit of faeces is reduced.

The authors point out that patients suspected of suffering from intestinal parasitic infection commonly have symptoms and that in these cases purgatives may be undesirable. It is recommended that they should not be used for diagnostic purposes since they do not in the authors' experience increase the chances of finding parasites and, in fact, seem to reduce them.

H. J. O'D. Burke-Gaffney

CATUREGLI, L. Patologia extraintestinale ad etiologia parassitaria. **[Extra-Intestinal Manifestations of Parasitic Origin]** *Giorn. di Malattie Infettive e Parassit.* 1960, July, v. 12, No. 7, 361–5.

Over a period of some 12 months, during 1959–60, the author examined 114 male and 206 female patients with a wide variety of complaints. 112 suffered mainly from asthenia, 45 from anaemia, 16 had signs of avitaminosis and 15 of liver disturbances, the complaints of 8 referred to the genital system, of 3 to the skin and of 2 to the chest. Stool specimens gave evidence of helminth infection in every one of these 201 patients with non-intestinal syndromes, 62·79% of the whole series. 49 others (15·31%) were also found infected, with signs and symptoms pointing to involvement of the gastro-intestinal (including the appendix) system. *Ascaris lumbricoides*, *Entamoeba histolytica*, *Endolimax nana*, *Enterobius vermicularis*, *Giardia intestinalis* and *Trichuris trichiura* were the parasites found.

The series represented a cross-section of the population of a country town and surrounding districts. Ages ranged from 3 to 65, being under 12 in 85 subjects.

The patients recovered with anthelmintic treatment and this "therapeutic evidence" is taken to confirm that the parasites were responsible for the signs and symptoms. *J. Cauchi*

LAINSON, R. **The Transmission of *Lankesterella* (=Atoxoplasma) in Birds by the Mite *Dermanyssus gallinae*.** *J. Protozoology*. Utica. 1960, Nov., v. 7, No. 4, 321–2.

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

MAFFI, M. & COLUZZI, M. *Anopheles macmahoni* Evans, nella regione della Migiurtinia, Somalia. **[*Anopheles macmahoni* in the Migiurtinia Region, Somalia]** *Riv. di Malariologia*. 1960, June, v. 39, Nos. 1/3, 119–29, 7 figs. on 2 pls. English summary.

Larvae from 9 different localities in Somalia have been reared to pupae and adults of *Anopheles macmahoni* [see also this *Bulletin*, 1959, v. 56, 7]. However, the larvae have enlarged abdominal tergites, suggestive of *A. funestus*, and also have numerous leaflets (15–21) in the thoracic palmate hair. These larvae appear to resemble *A. macmahoni* var. *barkhuusi* described from Ethiopia [*ibid.*, 1951, v. 48, 677]. *B. R. Laurence*

SAZONOVA, O. N. **[Blood-Sucking Mosquitoes in the City of Moscow]** *Med. Parasit. & Parasitic Dis.* Moscow. 1960, v. 29, No. 5, 541–4. [In Russian.]

The English summary appended to the paper is as follows:—

"The mosquito fauna was investigated in Moscow in spring and summer of 1955–1956 by examining the city parks, public gardens and cemeteries, i.e., areas covered with tree-plantations.

"Antimosquito destruction measures and systematic treatment of vegetation with insecticides resulted in complete elimination of malaria and of Anopheles in the city.

"The number of mosquitoes found in the central districts of the city and in large parks was insignificant. In some of the latter, however, and particularly in the outskirts of the city, a total of 6458 mosquitoes belonging to 20 different species could be caught. Most abundant in the collections were Aëdes punctor (40·0%), A. caspius dorsalis (20·9%) and A. favescans (10·0%). Of a rather frequent occurrence were also A. maculatus (5·7%), A. excrucians (5·5%) and A. cinereus (4·9%). The principal breeding places of mosquitoes are sparse tree-plantation of the park-type, where 15 species of Aëdes were found. Final extermination of all mosquitoes in the outskirts and suburban districts is the next task for the coming years."

MACDONALD, W. W. **Some Ecological Factors influencing the Distribution of Malayan Mosquitoes.** Reprinted from *Proc. Centenary & Bicentenary Congress of Biol., Singapore.* 1958, 117–22.

Much information has been accumulated about the distribution of various species of mosquitoes, but considerably less is known about the ecological factors which affect distribution. This paper gives examples of such factors for some of the non-anopheline mosquitoes found in Malaya.

The relative composition of the mosquito fauna is continually changing, and human activity is perhaps the most important reason for these changes. Some species have benefited enormously from human activity, multiplying in number, and becoming more widely dispersed; others have been reduced to vanishing point. The subgenus *Culex* of *Culex* and the subgenus *Stegomyia* of *Aedes* are two groups of mosquitoes which are now closely associated with man. *Culex* are mainly pool-breeders, and one or other species will colonize almost any kind of ground pool, ditch or drain; the adults will feed on a wide range of hosts, including man and his domestic animals. These characteristics explain why members of this group are prevalent in and around human settlements in many countries.

Of the *Aedes* group, one species, *A. aegypti*, almost certainly originated from Africa, but outside Africa has become completely domestic, breeding in water containers of all kinds, both inside and outside houses; the adults feed mainly on man. Dispersal from Africa has followed trade routes and at the beginning of the century it was to be found only in coastal towns of Malaya, but it is now one of the most common urban mosquitoes both inland and on the coast. *A. albopictus* is an oriental species not so dependent on man; although found in almost every village and town in Malaya, it can be found in untouched forest.

Both of these species of *Aedes* have successfully adapted to association with man.

Different types of association are exemplified by some of the forest mosquitoes, and the mosquitoes of coastal areas. The subgenus *Leicesteria* of *Armigeres* depends for its breeding requirements very largely on bamboos and secondly on a chrysomelid beetle. Some species will breed only where a tiny hole has been drilled by a young beetle larva into the internode of a young bamboo; others—which tend to have a wider distribution—will breed in bamboo stumps and sometimes tree-holes. Some of the coastal *Armigeres* species breed primarily in coconuts which have been gnawed open by squirrels, allowing rainwater to enter and mix with the contents. Their distribution may thus depend on the presence of both coconuts and squirrels, or other tree-climbing rodents.

In conclusion, the author emphasizes that much more investigation of ecological differences will be necessary before distribution and abundance of mosquitoes in different areas can be understood; he has touched only on some of the more obvious factors. *T. Wilson*

MACDONALD, W. W. & TRAUB, R. **Malaysian Parasites XXXVII. An Introduction to the Ecology of the Mosquitoes of the Lowland Dipterocarp Forest of Selangor, Malaya.** *Studies from Inst. Med. Res. Federation of Malaya.* 1960, No. 29, 79–109, 1 map. [Numerous refs.]

SOUTH PACIFIC COMMISSION. Noumea, New Caledonia. **A Review of the Mosquito Fauna of the South Pacific (Diptera: Culicidae).** [IYENGAR, M. O. T.]. *Technical Paper No. 130.* 1960, July, 103 mimeographed pp., 2 maps (1 on folding pl.). [20 refs.]

This is a revision of an earlier paper [this *Bulletin*, 1956, v. 53, 814]. It contains an indexed systematic list of the mosquitoes of the South Pacific, including New Guinea. The origin of this mosquito fauna and its distribution within the area are discussed. The distributions of malaria and periodic and non-periodic *Wuchereria bancrofti* infection are briefly summarized with their vectors. There is a list of the mosquitoes recorded from each island or island group. Names of mosquitoes follow the recent authoritative world list by STONE *et al.* [*ibid.*, 1960, v. 57, 546]; this involves the substitution of *Cellia*, which has priority by 18 days, for the subgeneric name *Myzomia* in *Anopheles*. *J. A. Reid*

DOBY, J. M., RAULT, B. & FRITEAU, M. Étude de la résistance acquise au lindane chez une souche d'*Aedes aegypti* ayant subi, en laboratoire, une sélection larvaire déterminée pendant cinq générations successives. Comparaison des résultats avec ceux obtenus avec la même souche vis-à-vis du D.D.T. [**Acquired Resistance to Lindane in** *Aedes aegypti* **which had been subjected to Selection in the Larval Stage for Five Generations: Comparison with DDT Resistance of the Same Strain**] *Bull. Soc. Path. Exot.* 1960, May–June, v. 53, No. 3, 550–57, 2 graphs.

In a continuation of studies on laboratory selection of a strain of *Aedes aegypti* with insecticides and with the same method as was used for DDT

selection [this *Bulletin*, 1961, v. 58, 270], this strain has now been selected with lindane. Using dilutions of a 1% solution of this latter insecticide (in 95% ethanol) the authors found that 10 times the concentration of DDT was required to produce similar mortalities. 5 successive selections with lindane producing 47, 33, 46, 52 and 90% mortalities were done and after the final selection the LC50–55 and LC70 had only doubled when compared with the unselected strain. This compares with a difference of 100 times when the strain was selected with DDT over a similar number of generations.

G. Davidson

Doby, J. M. & Friteau, M. Étude de la résistance croisée D.D.T.-lindane acquise en laboratoire par une souche d'*Aedes aegypti* [**Cross-Resistance to DDT and Lindane acquired in Laboratory Experiments with** *Aedes aegypti*] *Bull. Soc. Path. Exot.* 1960, May–June, v. 53, No. 3, 557–63. [15 refs.]

Larval selection with DDT through 5 generations produced a 100-fold increase [this *Bulletin*, 1961, v. 58, 270] and a similar selection with lindane through 4 generations produced a 2-fold increase [Doby *et al.*, above] in resistance to these respective insecticides in a strain of *Aedes aegypti* when comparisons were made with the unselected strain at about the LC50 level. The DDT-selected strain was found to be only 1½ times normal in its tolerance to lindane and the lindane-selected strain only twice normal in its tolerance to DDT at the LC50 levels. The authors conclude that the original strain is heterogenous in its tolerance to DDT but relatively homogenous in its tolerance to lindane and that there is no evidence for true cross-resistance between DDT and lindane. What slight cross-tolerance is evident is attributed to " vigour tolerance ".

G. Davidson

Ivanova, L. V. & Stavrovskaya, V. I. [**Preliminary Data on Field Trial Tests of Diethyltoluamides**] *Med. Parasit. & Parasitic Dis.* Moscow. 1960, v. 29, No. 5, 564–70, 2 figs. [In Russian.]

The English summary appended to the paper is as follows: —

" Subject to synthesis were orto-, meta- and para-diethyltoluamides (RR 207, 208, 209) which was realized by interaction of chlore anhydrides of toluyl acid with diethylamine in the presence of potash. There is also obtained a mixture of orto-, meta- and para-diethyltoluamides in ratios of 3%: 72%: 25% respectively (R-210).

" Individual field tests with meta-diethyltoluamide and with a mixture of isomers, carried out in the Moscow region against mosquitoes of the Aëdes genus, demonstrated that, when applied to the skin, these preparations represent a repellent much more effective than dimethylphthalate. 10–50% acetone solutions of R-210 were capable to protect the skin for 18 hours. A considerable prolongation of the effect from low concentrations of R-210 could be achieved by adding of fillers and fixatives. The trial tests demonstrated a more lasting effect of 0·5% and 1% acetone solutions of para-diethyltoluamide, as compared with the solutions containing equal concentrations of R-210. The protective action of dimethylphthalate is prolonged by adding to it 10% para-diethyltoluamide."

MICKS, D. W. **Susceptibility of Mosquitoes to Silica Gel Insecticides.** *J. Econom. Entom.*. 1960, Oct., v. 53, No. 5, 915–18, 1 fig.

[About 1930, certain chemically inert minerals were shown in Germany to be insecticidal to grain weevils. This line of research was developed later in Britain and it was found that their effect was due to damaging the waterproof waxy cuticle of the insects, which then died of desiccation. Lately these dehydrating dusts have been used for other insects, including some of medical importance.]

Two types of fine silica dust insecticides manufactured in the U.S.A. have been tested against mosquitoes. They were applied to filter papers which were fitted into cylinders used in the WHO test kit for adult mosquitoes [see this *Bulletin*, 1959, v. 56, 491]. Exposure was for 1 hour and mortality was determined after 24 hours in a clean chamber.

Three kinds of mosquito were used: *Anopheles quadrimaculatus*, *Culex fatigans* and *Aedes aegypti*; the first mentioned was found to be most susceptible. The dusts, Dri-Die and Silikil-D, were tested at 50 to 200 and 250 to 500 mgm./sq. ft. respectively. There was not a very good correlation of kill with dosage, though the highest dose was most effective in each case. The dusts were more effective if they had been applied to the paper by powdering rather than in an aqueous suspension, from which the water was later evaporated.

The effects on the mosquitoes at the lower dose rates could be largely counteracted by providing them with sugar solution to drink, after exposure (especially the *Anopheles* and *Culex*).

This toxic effect of these dusts was apparent even at 100% RH; indeed, with the Silikil-D the effect was greater at 95% RH than at 45% RH. This circumstance suggests that the effect is not really due to dehydration, but perhaps to some toxic effect of ammonium fluosilicate which is present in both the silica dusts. *J. R. Busvine*

MCCLELLAND, G. A. H. & WEITZ, B. **Further Observations on the Natural Hosts of Three Species of *Mansonia* Blanchard (Diptera, Culicidae) in Uganda.** *Ann. Trop. Med. & Parasit.* 1960, Oct., v. 54, No. 3, 300–304.

In a previous paper [this *Bulletin*, 1959, v. 56, 106] 5 species of *Mansonia*, subgenus *Coquillettidia*, were shown to feed mainly on birds in forest in Uganda, but one species, *M. fuscopennata*, fed on a wider range of host. Precipitin tests of the blood meals of 3 species captured in partly cultivated country outside the forest have confirmed that both *M. metallica* and *M. fraseri* feed mostly on birds and that *M. fuscopennata* takes its blood meals from a variety of mammals and also feeds on birds. Differences found between the variety of blood meals taken in forest and outside may be due to differences in host availability in the two situations. *B. R. Laurence*

LEWIS, D. J. & MINTER, D. M. **Internal Structural Changes in some African Phlebotominae.** *Ann. Trop. Med. & Parasit.* 1960, Oct., v. 54, No. 3, 351–65, 3 figs. [41 refs.]

The authors have examined the salivary glands, crop, midgut, Malpighian tubules, fat body, larval muscles, ovaries, spermathecae and the accessory glands

of female *Phlebotomus* and *Sergentomyia* from Africa in an attempt to find changes in these organs which permit the determination of the age composition of populations of adult sandflies. The results of this investigation are given in detail.

In the ovaries, follicular relicts, evidence of earlier oviposition, are very small and may be difficult to determine. Autogeny has been recorded in sandflies and was found in a colony of *P. papatasi* in Cairo.

The examination of the accessory glands proved to be of more practical value in separating parous from nulliparous females. The presence of granules of secretion in the accessory glands in most sandflies captured between gonotrophic cycles indicated that the female had already laid eggs.

Some applications of the use of this method in the field are described.

B. R. Laurence

Abonnenc, E. Sur trois phlébotomes nouveaux de la Région Éthiopienne: *Phlebotomus herollandi*, *P. adami* et *P. choumarai* n.sp. [**Three New Species of *Phlebotomus* from the Ethiopian Region: *P. herollandi*, *P. adami* and *P. choumarai***] *Arch. Inst. Pasteur d'Algérie*. 1960, Sept., v. 38, No. 3, 406–14, 4 figs.

Kettle, D. S. **The Flight of *Culicoides impunctatus* Goetghebuer (Diptera, Ceratopogonidae) over Moorland and its bearing on Midge Control.** *Bull. Entom. Res.* 1960, Nov., v. 51, Pt. 3, 461–89, 9 text figs. & 2 figs. on pl. [21 refs.]

See this *Bulletin*, 1959, v. 56, 890.

Nagaty, H. F. & Morsy, T. A. **Egyptian Biting Midges of the Genus *Culicoides* Latr. (Diptera: Ceratopogonidae).** Reprinted from *Bull. Soc. Entom. Egypte*. 1960, v. 44, 477–80, 1 fig.

David, H. V. **A Simple Method for Breeding the Eye Fly—*Siphunculina funicola* (Diptera, Oscinidae) in the Laboratory and some Observations on its Life Cycle.** *Indian J. Med. Res.* 1960, May, v. 48, No. 3, 326–30.

Experiments to find a suitable breeding medium for *Siphunculina* in Ceylon involved the testing of 20 different media, made up from decomposing vegetable material, fruits, meat and faeces. Most of these materials were mixed with sterilized sand, and the best results were obtained when the mixtures were autoclaved.

Decomposing organic matter of animal origin gave the best results for oviposition, although eggs were also laid readily on coconut refuse. Decomposing fish mixed with sand was used to maintain a colony of these flies.

The breeding medium is kept in Petri dishes and moistened with distilled water. Puparia are removed from the breeding dishes and transferred to filter paper in another Petri dish. The flies emerge into 15-inch cubic cages and

mating takes place readily, from about 1 hour after emergence. The complete life cycle, egg to adult, takes an average of 22 days (12 to 41 days) at 80–89°F. [The number of generations maintained in the colony by this method is not stated.] *B. R. Laurence*

LaBrecque, G. C., Adcock, P. H. & Smith, C. N. **Tests with Compounds affecting House Fly Metabolism.** *J. Econom. Entom.* 1960, Oct., v. 53, No. 5, 802–5. [11 refs.]

"Two hundred compounds were tested for ability to sterilize or otherwise interfere with the normal development of house flies (*Musca domestica* L.). Seventy-nine had some deleterious effect when added to the larval medium, but only ten affected development when combined with the adult food. Amethopterin (Methotrexate®; *N*-[*p*{(2,4-diamino-6-pteridylmethyl] methyl-amino} benzoyl) glutamic acid), the most active compound, caused sterility in the females but not in the males, in a single feeding when given in the initial meal, and reduced subsequent oviposition when given in a later meal. Oviposition of house flies maintained in a room with a choice of treated and untreated food was only 2% as high as that of flies given only untreated food."

Smith, C. N., LaBrecque. G. C., Wilson, H. G., Hoffman, R. A., Jones, C. M. & Warren, J. W. **Dimetilan Baits, Fly Ribbons and Cords for the Control of House Flies.** *J. Econom. Entom.* 1960, Oct., v. 53, No. 5, 898–902.

"Dimetilan (3-methyl-5-pyrazilyl dimethylcarbamate) incorporated in sugar baits was effective against organophosphorus-resistant house flies (*Musca domestica* L.) in laboratory tests. In field tests in dairy barns in central Florida, against flies known to be resistant to certain organophosphorous insecticides, 1% Dimetilan baits gave effective control in one of two tests. Ribbons impregnated with a sweet syrup and Dimetilan, and cords impregnated with a mixture of parathion and Diazinin (*O*,*O*-diethyl *O*-(2-isopropyl-4-methyl-6-pyrimidinyl) phosphorothioate) gave practical control of house flies in hog parlours at Stoneville, Miss., but not in barns and/or poultry houses at Lincoln, Nebr., Kerrville, Tex., and Orlando, Fla. Piperonyl butoxide gave 2½-fold synergism with Dimetilan at a ratio of 10:1 in contact sprays."

Bettini, S., Boccacci, M. & Natalizi, Giuseppina. Ricerche sugli effetti tossici di alcuni bromo- e cloroacetati in ceppi sensibili e "resistenti" di *Musca domestica* L. [**Studies on the Toxic Effect of some Bromo- and Chloroacetates to Susceptible and "Resistant" Strains of** *Musca domestica* **L.**] *Rendiconti Istituto Superiore di Sanità.* Rome. 1960, v. 23, Pts. 7/8, 634–51, 8 figs. [24 refs.]

The English summary appended to the paper is as follows:—

"The authors report the results obtained by studying *a*) the relationship between iodo-, bromo- and chloroacetic acids and between myristyl and cetyl bromo- and chloroacetates in regard to their speed of action on a resistant strain (K_1)

of *Musca domestica*; *b*) the behaviour of six strains of *M. domestica* (susceptible: S-Roma and Svizzera; resistant: R-Sardegna, Acido-R, P_2 and K_1) towards the above mentioned esters; *c*) the cumulative action of sub-lethal doses of myristyl chloroacetate on flies of strain K_1."

[See this *Bulletin*, 1957, v. 54, 1022.]

GOSTICK, K. G. & HEWLETT, P. S. **Killing House-Flies, *Musca domestica* L., by means of Hanging Drops of Insecticide.** *Bull. Entom. Res.* 1960, Nov., v. 51, Pt. 3, 523–32, 3 figs. [12 refs.]

PHILIP, C. B. **Malaysian Parasites XXXV. Descriptions of some Tabanidae (Diptera) from the Far East.** *Studies from Inst. Med. Res. Federation of Malaya.* 1960, No. 29, 1–32, 27 figs.

PHILIP, C. B. **Malaysian Parasites XXXVI. A Summary Review and Records of Tabanidae from Malaya, Borneo, and Thailand.** *Studies from Inst. Med. Res. Federation of Malaya.* 1960, No. 29, 33–78, 2 pls. & 2 figs. [31 refs.]

See also p. 299, COVA GARCIA & SUAREZ **[Study of Triatomid Bugs in Venezuela].**

KAWASHIMA, K., KAMO, H. & MIYAZAKI, I. **A Case of Human Infestation with a Hard Tick *Amblyomma testudinarium* Koch, 1844 in Japan (Acarina: Ixodidae).** *Kyushu J. Med. Sci.* Fukuoka. 1960, Apr., v. 11, No. 2, 77–80, 2 figs.

NADCHATRAM, M. **Malaysian Parasites XLVIII. Notes on rearing Malayan Ixodid Ticks (Acarina, Ixodidae) with special reference to *Ixodes granulatus* Supino and *Amblyomma geoemydae* (Cantor).** *Studies from Inst. Med. Res. Federation of Malaya.* 1960, No. 29, 217–24.

KUMADA, N., KANEKO, K., KUGOH, T., HAGI, K. & UTSUMI, K. **On the Occurrence of *Trombicula* (*Neotrombicula*) *pomeranzevi* from Nikko, Central Honshu, Japan, with Critical Notes on its Taxonomic Situation.** *Bull. Tokyo Med. & Dental Univ.* 1959, Dec., v. 6, No. 4, 421–38, 3 figs. & 3 pls.

DOMROW, R. & NADCHATRAM, M. **Malaysian Parasites XLIII.** *Neoschongastia* **in Malaya (Acarina, Trombiculidae).** *Studies from Inst. Med. Res. Federation of Malaya.* 1960, No. 29, 185–93, 42 figs.

RACHOU, R. G. Algumas manifestações de resistência de comportamento de insetos aos inseticidas no Brasil. **[Manifestations of Behaviour Resistance to Insecticides by Insects in Brazil]** *Rev. Brasileira Malariologia.* Rio de Janeiro. 1958, July, v. 10, No. 3, 277–90. English summary.

NAT. AGRIC. CHEM. ASS. & ENTOM. SOC. OF AMER.: A Symposium sponsored by. Washington, D.C., October 7–8, 1959. **Research Progress on Insect Resistance.** *Misc. Pub. Entom. Soc. Amer.* 1960, Oct., v. 2, No. 1, 1–175, illustrated. [Numerous refs.]

In the spate of symposia on insecticide resistance which has taken place in recent years, this one is unique in presenting the views of both commerce, represented by the chemical industry, and research, represented by university and government institutions, for the most part of the United States. The purposes of the symposium were to make manufacturers and research bodies aware of the importance of resistance, to encourage the establishment of standard test methods to help in the detection of resistance and to stimulate research on the mode of action of insecticides and so put the development of new compounds on a rational basis.

Of the 23 papers presented, 9 concern agricultural aspects and 3 general considerations on future research. The remainder cover general, genetical and biochemical aspects of resistance in insects of medical importance as well as considerations of methods of detection of resistance in these pests.

In an article on cockroach resistance (J. M. GRAYSON, *Insecticidal Resistance and Control in Cockroaches*, pp. 55–58), the widespread occurrence of resistance to chlordane and related chlorinated hydrocarbons in the German cockroach (*Blattella germanica*) is recorded. Resistance to DDT has been induced in laboratory colonies of this species, but is soon lost in the absence of selection. The results of testing numerous other insecticides for cockroach control, *e.g.* organic phosphates and silica aerogels are given in general terms.

An extensive review of resistance in some 50 arthropod species of public health importance (A. W. A. BROWN, *The Resistance Problem, Vector Control and WHO*, pp. 59–67) is given by an expert who spent two years at the World Health Organization centre in Geneva collecting and disseminating information on resistance from all parts of the world. The part played by WHO in standardizing test techniques for the detection of resistance in several of the major groups of pests of medical importance and in the stimulation of research on the biochemical and genetical aspects of resistance is described.

Genetics forms the subject of two papers. In one (J. F. CROW, *Genetics of Insecticide Resistance: General Considerations*, pp. 69–74) the evidence for resistance being a pre-adaptive genetic character is outlined. The nature of the gene or genes involved varies in different species but in all the carefully analysed cases of resistance the mode of inheritance is either monofactorial or, if polyfactorial, the effects of the different genes are additive. The rate at which a population becomes resistant depends on whether the factor for resistance imparts enhanced survival, on its degree of dominance, on its original frequency and on the selection pressure the population is subjected to. A logical explanation is given for the rapid reappearance of resistance with renewed selection in some populations which have reverted to apparent susceptibility on the temporary removal of the selecting agent.

In the second article on genetics (R. MILANI, *Genetic Studies on Insecticide-Resistant Insects*, pp. 75–83), in addition to surveying other cases where careful genetic analysis has been made, the author gives details of his own work on knockdown resistance in the house-fly (*Musca domestica*). Using genetically marked strains and doing repeated back-crosses, he has shown the existence and

location in its linkage group of a major gene for DDT resistance in the Orlando-R strain of *M. domestica* and finds strong evidence for a sex-limited enhancer of dominance acting on the two known genes for knockdown resistance.

In the first of three papers dealing with the problem of detecting and estimating resistance (W. M. HOSKINS, *Use of the Dosage-Mortality Curve in Quantitative Estimation of Insecticide Resistance*, pp. 85–91) use is made of recorded data for *Anopheles gambiae* and lindane, *Culex pipiens quinquefasciatus* [*fatigans*] and dieldrin, *Musca domestica* and DDT and *Boophilus microplus* and toxaphene, to illustrate the effect of variations in the proportions of true resistant, true susceptible and hybrid individuals on the shape of log-probit regression lines. The use of such curves for the detection of resistance and for the determination of phenotype proportions is advocated. The second paper (G. DAVIDSON, *The Importance of the Discriminating Dosage in the Determination of Insecticide Resistance in Anopheline Mosquitoes*, pp. 93–94) points out the danger of relying solely on dosage-mortality curves especially where small numbers of dosages and small numbers of test insects are employed. Work on anopheline mosquitoes indicates a reliable method for the detection of resistance by using single discriminating dosages only. Test methods, tentative, provisional and established, adopted by WHO and the U.S. Armed Forces Pest Control Board for the detection of resistance in mosquitoes, body-lice, fleas, bed-bugs, sandflies, black-flies, tsetse flies and triatomids form the subject of the third article (K. D. QUARTERMAN, *Test Methods for Establishing Levels of Susceptibility and Detecting the Development of Resistance in Insects of Public Health Importance*, pp. 95–102).

Great weight is attached to the importance of biochemical research in elucidating resistance problems and in rationalizing the search for new insecticides. In the first of four articles on the subject (C. W. KEARNS, *Biochemical Aspects of Resistance*, pp. 113–117), our lack of knowledge of the exact mode of action of many of the modern insecticides is stressed and a plea is made for more basic research on insect physiology. The fact that there exists plenty of evidence that many insecticides are attacked by enzyme systems seems to point to the need to explore further the possibilities that the effect of these insecticides may have to do with their action on vital enzyme systems. Chlorinated hydrocarbon resistance is extensively reviewed by A. S. PERRY (*Biochemical Aspects of Insect Resistance to the Chlorinated Hydrocarbon Insecticides*, pp. 119–137), who is of the opinion that these insecticides do not act as inhibitors of enzyme systems. This author details the known detoxication mechanisms in pests of both agricultural and medical importance.

Work on organo-phosphorus resistance described by R. B. MARCH (*Biochemical Aspects of Organo-phosphorus Resistance*, pp. 139–144) gives a ray of hope for the future of these compounds. Resistance to o-p insecticides is much more specific than is resistance to chlorinated hydrocarbons; there is considerably less cross-resistance and it is implied that alternatives will always be available if resistance does develop.

A relatively new group of insecticides, the carbamates, are dealt with in an article by H. H. MOOREFIELD, (*Insect Resistance to the Carbamate Insecticides*, pp. 145–152). These compounds resemble the organic phosphates in their mode of action and in the usually limited pattern of cross-resistance shown by insects developing resistance to any one of them. Three examples are cited as capable

of producing resistance readily in the house-fly though the addition of synergists, *e.g.* methylenedioxyphenol, appears to suppress the development of this resistance. *G. Davidson*

MISCELLANEOUS PAPERS

MILLER, C. **Observation on Liver Size in Healthy Jamaican Children. Hermitage Survey.** *West Indian Med. J.* 1960, June, v. 9, No. 2, 124–30.

To obtain some information about liver size in apparently normal children, the author examined all the 350 children under the age of 12 years living in the Hermitage settlement, or village.

He examined the children in the supine position in expiration, and measured the distance of the liver edge below the costal margin in the mid-clavicular line in centimetres. He also weighed and measured the children, made an estimation of the amount of animal protein in their diet, checked on their consumption of bush tea (a cause of veno-occlusive disease of the liver), and performed certain laboratory tests on a sample.

He found that up to 8 years of age all the children had palpable livers, and that between 8 and 12 years there was a slight decline to 70% palpable. When he made a quantitative estimation he found that there was an increase up to the age of 2 years, which is contrary to the usual idea.

There was no correlation between liver size and deficient protein intake, but in fact the reverse, and no evidence that the bush teas taken (which did not include the known toxic varieties) correlated with enlargement.

In laboratory testing he compared some of the possessors of the largest livers in each age-group with the smallest or non-palpable livers. In these very few subjects there was no difference in haemoglobin, degree of infection with stool parasites, or plasma protein composition.

He concludes—"It would appear therefore that in this survey none of the commonly reputed causes of liver enlargement . . . can be incriminated. It may well be therefore that a moderate degree of liver enlargement even up to the age of 12 years can be regarded as normal." *A. C. E. Cole*

O'ROURKE, F. J. **Zoonoses—the Diseases of Animals transmissible to Man.** *Irish J. Med. Sci.* 1960, Oct., 6th Ser., No. 418, 443–52. [62 refs.]

This paper represents a lecture to the Section of Public Health of the Royal Academy of Medicine in Ireland in April 1960. The author, who is Professor of Zoology in University College, Cork, writes with a background of medical and scientific qualifications and experience of entomology in relation to tropical disease; this is reflected in the careful balance shown in the paper between the epidemiological and epizootic aspects of the zoonoses in tropical and non-tropical regions alike.

The review touches on a wide range of zoonoses, but the author wisely concentrates mostly on a number of specific examples to illustrate the ubiquity and increasing significance of this group of diseases. They are broadly classified as

(a) feral zoonosis, which includes examples of protozoal, viral, bacterial and helminthic infections, (b) domestic zoonosis ; this in turn is subdivided into intra-domestic (pets, rats and mice) and peridomestic (pigs, cattle, sheep and poultry).

Throughout, the evolution and changes in the character of many diseases in relation to animal reservoirs, and the links between these reservoirs and between them and man, are well brought out.

The review is up to date—only about one-third of the 62 references cited are dated earlier than 1957—and evidently wide reading of the literature is distilled in it. Such concentration inevitably leads at times to an appearance of dogmatism, and specialists would perhaps wish for elaboration of some of the points raised: but for the wider audience for whom the paper was primarily intended this review is admirable and indicates clearly the need for greater recognition of the importance of these diseases by non-specialists, particularly in temperate climates where this importance is perhaps not yet fully appreciated.

H. J. O'D. Burke-Gaffney

REPORTS AND SURVEYS

WEBSTER, M. H. **The Medical Aspects of the Kariba Hydro-Electric Scheme.** *Central African J. of Med.* 1960, Oct., v. 6, No. 10, Suppl., 36 pp., 6 figs., 13 pls. & 1 map.

At Kariba the Zambesi, having flowed slowly across a flat alluvial plain for 180 miles, plunges into a deep, narrow gorge. Just before this, it is joined by the confluence of the Sanyati and Naodsa river systems, along the course of which conditions favour the breeding of mosquitoes and tsetses of the *Glossina morsitans* group. The hills surrounding the gorge rise to 1,600 feet above the river, and to avoid the intense humid heat of the gorge itself the living quarters of the labour force were sited on top of them. Since the maximum temperature at the working site was 113°F. with relative humidity up to 80%, the expense of access to the hill site was amply justified. It was necessary to educate all workers in the dangers of heat stroke and heat exhaustion. Dangerous carelessness is an early symptom, and accidents were responsible for 95 out of a total of 151 deaths of workers.

Hyperendemic malaria was present in the area, with *Anopheles gambiae* and *A. funestus* as vectors. A malaria control officer was appointed from the outset, and undertook mosquito control mainly by residual spraying with BHC 3 times yearly. A wettable powder was used in African houses, but on aesthetic grounds an oily preparation was applied with a paint spray in European houses. No evidence of resistance in anophelines appeared, but bed-bugs did become resistant, and organic phosphorus compounds had to be used in the African township. A constant watch had to be kept for new camps erected sporadically by sub-contractors, and for the unauthorized compounds of hangers-on: these compounds were ruthlessly destroyed. *Anopheles* breeding places were also attacked. On one occasion the application of " Soil Insecticide ", a product used for termite-proofing foundations, kept some pools free of insect life for more than 3 months. Besides the antimalarial campaign all workers, European and African, were obliged to take a prophylactic, pyrimethamine being the eventual choice.

Trypanosomiasis carried by *G. morsitans* was a likely danger. Protective clearing was ruled out on grounds of cost, and an area of 15 square miles was treated from the air with BHC smoke at a total cost of some £12,000.

For the main township of the labour force, a water-carried sanitation system was planned. In the early stages, according to the degree of " permanence " of occupation in any area, deep pit latrines or aqua privies or a water-carriage system was used. Latrine captains were appointed as permanent tutors to the African labourers in the technique of using a water latrine, and amply justified themselves. New housing areas were not allowed to be occupied until their sanitation was in working order, and temporary housing was destroyed when evacuated. Improvised chemical closets were scattered around the construction side of the " permanent " town, and offenders were dealt with according to the " penal code favoured by the Mikado ". On the actual dam site, water-carriage latrines were justified. Refuse disposal was by controlled tipping from covered lorries. The fact that the chief medical officer was a gazetted MOH was of the greatest benefit in enforcing sanitary rules.

African workers and " authorized families " were supplied with generous rations, including 3 pounds of meat a man/week, throughout. Fresh vegetables were supplied in a daily cooked meal. Until this was done there were cases of scurvy in the labour force, manifested by " woody " muscular swellings, mainly in the calves, which cleared up on ascorbic acid treatment.

Hospital accommodation was provided on a generous scale (some 100 beds in all), partly because much of the labour force was composed of single or separated men, who it was felt, would be best looked after as in-patients even when mildly ill.

Thus an adequate and comprehensive health service was provided at a cost (including the capital cost of the hospital, which remains as a permanent asset) of £8·1 a head a year, or a total cost for medical services amounting to 0·3% of the whole scheme.

[The evacuation and resettlement of the indigenous population whose homes were flooded was not altogether simple. Resistance to being moved resulted in many cases in a prolonged period between the last harvest in the original homes and the first in the resettlement area. The most serious consequence was that some, eating unfamiliar roots, suffered from a condition resembling the vomiting sickness of Jamaica. Anyone interested in public health, or in Africa, should read this paper.] *B. B. Waddy*

BOOK REVIEWS

BARBOSA, Frederico Simões, CARNEIRO, Elizabeth & BARBOSA, Ivete, with the collaboration of José Fortes MAGALHÃES. **Manual de malacologia médica (trabalhos práticos).** [Manual of Medical Malacology] pp. x + 182, 110 figs. 1960. Salvador: Fundação Gonçalo Moniz, Bahia, Brazil.

The first special course in medical malacology was started recently in Brazil by Dr. Barbosa at Recife. This manual was written specifically for people

attending this course and it is designed for use by those concerned with schistosomiasis in South America.

The book begins with a general account of the Mollusca and goes into considerable detail of comparative shell structure in the Gastropoda and their general anatomy. There follows a general description of the family Planorbidae, details of methods of narcotization, fixation and dissection and a key for the identification of the South American hosts of *Schistosoma mansoni*, and also detailed descriptions of the shells and anatomy of these species. Part III deals with the natural history of planorbid snails and includes information on the techniques of collecting and estimating population densities as well as the life cycle of the snails, breeding methods and ecology. The rest of the book is devoted to an account of the host-parasite relationships between larval schistosomes and snails, a brief review of molluscicides and their application and an outline of the organization of a laboratory for malacological work.

This manual is a most valuable publication for which there has been a need for many years. In it is a great deal of information which will be of use to all those concerned with snail-borne diseases, not only in South America but also in Africa. *C. A. Wright*

HOLMES, W. J., **Geographic Ophthalmology. Asia, Australia and Africa.**

This book is reviewed on p. 376.

COLLIS, Robert. **A Doctor's Nigeria.** 264 pp., 8 figs. on 6 pls. & 1 map. 1960. London: Secker & Warburg, 7, John Street, W.C.1. [25s.]

Dr. Collis spent 18 months in Nigeria, as head of the Paediatrics Department at University College, Ibadan, and describes his experiences in this book. Perhaps a reviewer who spent his active life in West Africa should not be too carping about what appears to be a certain superficiality. The author lacks the penetration of a Huxley or a Wills, and the book, both in content and disjointedness, gives the impression of being a tour's letters home, strung together. When, late in the book, the author sets down his ideas on the reorganization of Nigeria's medical services, his solution—to drive the administrative doctors back into practice, leaving the offices to " trained secretaries "—makes it clear that he has never seen a promoted district commissioner wrestling with the problems of artificial foetus supplies for a midwifery school. Also, surely it is inexcusable for a medical man to produce yet another perversion of that much abused title, onchocerciasis. The version in this book is " onchosomiasis ".

The book has some good points to make: the desperate need for improved infant welfare services, and for doctors of whatever nationality. And, undeniably, it makes easy, entertaining reading. *B. B. Waddy*

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